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IMPLEMENTATION PLAN REVIEW FOR TEXAS AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT

TRW/Environmental Services

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16. ABSTRACT

Section IV of the Energy Supply and Environmental Coordination Act of 1974, (ESECA) requires EPA to review each State Implementation Plan (SIP) to determine if revisions can be made to control regulations for stationary fuel combustion sources without interfering with the attainment and maintenance of the national ambient air quality standards. This document, which is also required by Section IV of ESECA, is EPA's report to the State indicating where regulations might be revised.

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FOR
TEXAS
REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT

PREPARED BY THE FOLLOWING TASK FORCE:

U. S. Environmental Protection Agency, Region VI
1600 Patterson, Suite 1100
Dallas, Texas 75201

Environmental Services of TRW, Incorporated
(Contract 68-02-1385)

U. S. Environmental Protection Agency
Office of Air and Waste Management
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

APRIL 1975

TEXAS

ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT
(SECTION IV - STATE IMPLEMENTATION PLAN REVIEW)

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1.0 EXECUTIVE SUMMARY

The enclosed report is the U. S. Environmental Protection Agency's (EPA) response to Section IV of the Energy Supply and Environmental Coordination Act of 1974 (ESECA). Section IV requires EPA to review each State Implementation Plan (SIP) to determine if revisions can be made to control regulations for stationary fuel combustion sources without interfering with the attainment and maintenance of the National Ambient Air Quality Standards (NAAQS). In addition to requiring that EPA report to the State on whether control regulations might be revised, ESECA provides that EPA must approve or disapprove any revised regulations relating to fuel burning stationary sources within three months after they are submitted to EPA by the States. The States may, as in the Clean Air Act of 1970, initiate State Implementation Plan revisions; ESECA does not, however, require States to change any existing plan.

Congress has intended that this report provide the State with information on excessively restrictive control regulations. The intent of ESECA is that SIP's, wherever possible, be revised in the interest of conserving low sulfur fuels or converting sources which burn oil or natural gas to coal. EPA's objective in carrying out the SIP reviews, therefore, has been to try to establish if emissions from combustion sources may be increased. Where an indication can be found that emissions from certain fuel burning sources can be increased and still attain and maintain NAAQS, it may be plausible that fuel resource allocations can be altered for "clean fuel savings" in a manner consistent with both environmental and national energy needs.

In many respects, the ESECA SIP reviews parallel EPA's policy on clean fuels. The Clean Fuels Policy has consisted of reviewing implementation plans with regards to saving low sulfur fuels and, where the primary sulfur dioxide air quality standards were not exceeded, to encourage States to either defer compliance regulations or to revise the SO_2 emission regulations. The States have also been asked to discourage large scale shifts from coal to oil where this could be done without jeopardizing the attainment and maintenance of the NAAQS.

To date, EPA's fuels policy has addressed only those States with the largest clean fuels saving potential. Several of these States have or are currently in the process of revising SO_2 regulations. These States are generally in the eastern half of the United States. ESECA, however, extends the analysis of potentially over-restrictive regulations to all 55 States and territories. In addition, the current reviews address the attainment and maintenance of all the National Ambient Air Quality Standards.

There are, in general, three predominant reasons for the existence of overly restrictive emission limitations within the State Implementation Plans. These are: 1) The use of the example region approach in developing Statewide air quality control strategies; 2) the existence of State Air Quality Standards which are more stringent than NAAQS; and 3) the "hot spots" in only part of an Air Quality Control Region (AQCR) which have been used as the basis for controlling the entire region. Since each of these situations affect many State plans and in some instances conflict with current national energy concerns, a review of the State Implementation Plans is a logical follow-up to EPA's initial appraisal of the SIP's conducted in 1972. At that time SIP's were approved by EPA if they demonstrated the attainment of NAAQS or more stringent state air quality standards. Also, at that time an acceptable method for formulating control strategies was the use of an example region for demonstrating the attainment of the standards.

The example region concept permitted a State to identify the most polluted air quality control region (AQCR) and adopt control regulations which would be adequate to attain the NAAQS in that region. In using an example region, it was assumed that NAAQS would be attained in the other AQCR's of the State if the control regulations were applied to similar sources. The problem with the use of an example region is that it can result in excessive controls, especially in the utilization of clean fuels, for areas of the State where sources would not otherwise contribute to NAAQS violations. For instance, a control strategy based on a particular region or source can result in a regulation requiring one percent sulfur oil to be burned statewide where the use of three percent sulfur coal would be adequate to attain NAAQS in some locations.

EPA anticipates that a number of States will use the review findings to assist them in making the decision whether or not to revise portions of their State Implementation Plans. However, it is most important for those States which desire to submit a revised plan to recognize the review's limitations. The findings of this report are by no means conclusive and are neither intended nor adequate to be the sole basis for SIP revisions; they do, however, represent EPA's best judgment and effort in complying with the ESECA requirements. The time and resources which EPA has had to prepare the reports has not permitted the consideration of growth, economics, and control strategy tradeoffs. Also, there has been only limited dispersion modeling data available by which to address individual point source emissions. Where the modeling data for specific sources were found, however, they were used in the analysis.

The data upon which the reports' findings are based is the most currently available to the Federal Government. However, EPA believes that the States possess the best information for developing revised plans. The States have the most up-to-date air quality and emissions data, a better feel for growth, and the fullest understanding for the complex problems facing them in the attainment and maintenance of air quality standards. Therefore, those States desiring to revise a plan are encouraged to verify and, in many instances, expand the modeling and monitoring data supporting EPA's findings. In developing a suitable plan, it is suggested that States select control strategies which place emissions for fuel combustion sources into perspective with all sources of emissions such as smelters or other industrial processes. States are encouraged to consider the overall impact which the potential relaxation of overly restrictive emissions regulations for combustion sources might have on their future control programs. This may include air quality maintenance, prevention of significant deterioration, increa ed TSP, NO_x, and HC emissions which occur in fuel switching, and other potential air pollution problems such as sulfates.

Although the enclosed analysis has attempted to address the attainment of all the NAAQS, most of the review has focused on total suspended particulate matter (TSP) and sulfur dioxide (SO_2) emissions. This is because stationary fuel combustion sources constitute the greatest source of SO_2 emissions and are a major source of TSP emissions.

Part of each State's review was organized to provide an analysis of the SO_2 and TSP emission tolerances within each of the various AQCRs. The regional emission tolerance estimate is, in many cases, EPA's only measure of the "over-cleaning" accomplished by a SIP. The tolerance assessments have been combined in Appendix B with other regional air quality "indicators" in an attempt to provide an evaluation of a region's candidacy for changing emission limitation regulations. In conjunction with the regional analysis, a summary of the State's fuel combustion sources (power plants, industrial sources, and area sources) has been carried out in Appendix C, D, and E.

The State Implementation Plan Review has addressed the emissions from fuel combustion sources in each of Texas' twelve AQCRs. For your convenience a map showing Texas and its AQCRs is reproduced on page 6.

The major findings of this review are as follows:

- As required by Section IV of ESECA, the Implementation Plan for the State of Texas has been reviewed with particular attention to the most frequent causes of overly restrictive emission limiting regulations. It does not appear that regulations for TSP and SO_2 are overly restrictive, however, the formats of the regulations do not lend themselves to definitive analysis of restrictiveness.

- For all stationary fuel combustion sources (except steam generators using solid fossil fuel) Texas' particulate and SO_2 regulations specify a maximum ambient concentration to be observed beyond the premises of a source and/or a maximum time-based emission rate that depends on a variety of source specific stack parameters. As a result, it is not possible to determine whether the air quality observed in the State is due to regulations which could limit the use of certain fuels, or to an otherwise specific level of emissions.

- There are indications of a widespread particulate problem throughout the State. Air quality data, combined with current plans for air quality maintenance in the Southern Louisiana-Southeast Texas (106), Corpus Christi-Victoria (214), Metropolitan Dallas-Fort Worth (215) and Metropolitan Houston-Galveston (216) AQCRs, suggest that any increase of emissions in the State would only aggravate the current TSP situation.

- This review finds no indication that SO_2 NAAQS are being violated. However, because the restrictiveness of the State's SO_2 regulation cannot be evaluated, it is not known if Texas' low ambient SO_2 levels are the result of an overly restrictive control of emissions, a low level sulfur content of the fuel used, or to some other factor such as meteorology.

- Though natural gas is the major fuel used in the State's 73 identified power plants, 65 of these plants also use oil. Thus, there are many sources which have the ability to undergo fuel switches aimed at decreasing the use of natural gas.

- One power plant in Texas has the capability to use a solid fossil fuel and/or gas. This plant used only lignite in 1973. Two additional power plants in Texas are currently using lignite but it is unknown whether they can also use other fuels.

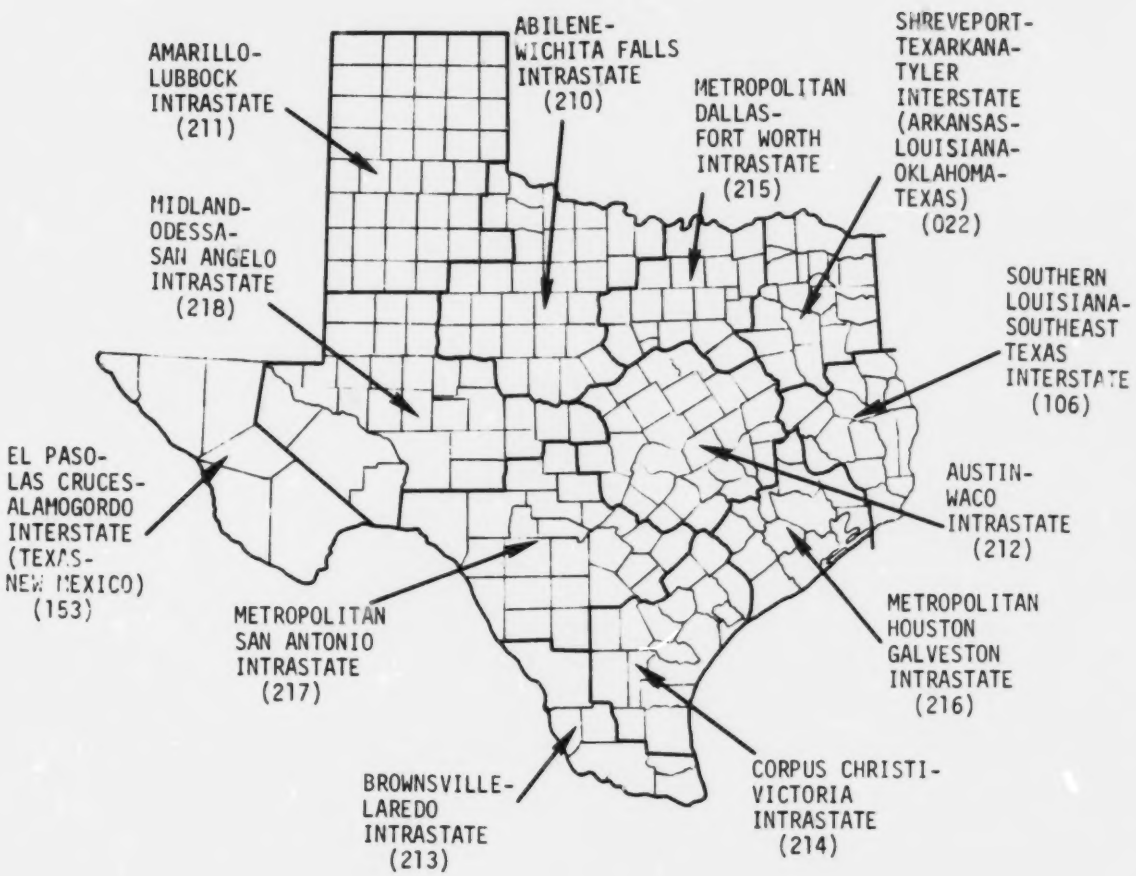

Figure 1. Air Quality Control Regions in Texas

2.0 STATE IMPLEMENTATION PLAN REVIEW

2.1 SUMMARY

A revision of fuel combustion source emissions regulations will depend on many factors. For example:

- Does the State have air quality standards which are more stringent than NAAQS?
- Does the State have emission limitation regulations for control of (1) power plants, (2) industrial sources, (3) area sources?
- Did the State use an example region approach for demonstrating the attainment of NAAQS or more stringent State standards?
- Has the State not initiated action to modify combustion source emission regulations for fuel savings; i.e., under the Clean Fuels Policy.
- Are there no proposed Air Quality Maintenance Areas?
- Are there indications of a sufficient number of monitoring sites within a region?
- Is there an expected 1975 attainment date for NAAQS?
- Based on reported (1973) Air Quality Data, does air quality meet NAAQS?
- Based on reported (1973) Air Quality Data, are there indications of a tolerance for increasing emissions?
- Is the fraction of total emissions from stationary fuel combustion sources higher than those of other sources?
- Do modeling results for specific fuel combustion sources show a potential for a regulation revision?
- Must emission regulations be revised to accomplish significant fuel switching?
- Based on the above indicators, what is the potential for revising fuel combustion source emission limiting regulations?
- Is there a significant clean fuels savings potential in the region?

This report is directed at answering these questions. An AQCR's potential for revising regulations increases when there are affirmative responses to the above.

The initial part of the SIP Review Report, Section 2 and Appendix A, was organized to provide the background and current situation information for the State Implementation Plan. Section 3 and the remaining Appendices provide an AQCR analysis which helps establish the overall potential for revising regulations. Emission tolerance estimates have been combined in Appendix B with other regional air quality "indicators" in an attempt to provide an evaluation of a region's candidacy for revising emission limiting regulation. In conjunction with the regional analysis, a characterization of the State's fuel combustion sources (power plants, industrial sources, and area sources) has been carried out in Appendices C, D and E.

Based on an overall evaluation of EPA's current information, AQCRs have been classified as "good," "marginal," or "poor" candidates for regulations revisions. These ratings, which are shown in the Summary Table on page 10 were determined by assessing the following criteria:

Good	Poor	Marginal
1) Adequate number of air monitoring sites	1) Violation of NAAQS	1) No air quality data or insufficient number of monitoring sites
2) No NAAQS violations	2) Attainment date for NAAQS later than 1975	2) Inconsistent "indicators"
3) Attainment date of 1975 for NAAQS in the SIP	3) Proposed AQMA	
4) No proposed AQMAs	4) Modeling results show no potential for regulation revision	
5) Modeling results show a potential for revision		

For an AQCR to be rated as a good candidate, all of the criteria listed under "Good" would have to be satisfied. The overriding factor in rating an AQCR as a poor candidate is a violation of either the primary or secondary National Ambient Air Quality Standards during 1973. However, if any of the other conditions listed under "Poor" exists, the AQCR would

still receive that rating. The predominant reason for a marginal rating is a lack of sufficient air quality data. Marginal ratings are also given when there are varying or inconsistent "indicators."

After a candidacy has been given to a region, a follow-up analysis should be conducted depending on the rating. A region that has been indicated to be a good candidate for regulation revision should be examined in more detail by the state and the regional office of the EPA, including an examination of current air quality, emissions, and fuel use data, with which the state has more familiarity. If the state feels that clean fuels could be saved in a region rated marginal, then an anlysis of air quality data that may have become available since this report should be examined. If current data do not indicate a potential for regulation revision then further study would not be warranted. An AQCR that has been indicated to be a poor candidate would not warrant further study unless the state feels that new information has become available indicating that the poor rating is no longer valid.

STATE IMPLEMENTATION PLAN REVIEW (SUMMARY TABLE) - TEXAS

"INDICATORS"	STATE		SHREVEPORT-TEXARKANA-TYLER AQCR 022		S. LOUISIANA-S.E. TEXAS AQCR 106		EL PASO-LAS CRUCES-ALAMOGORDO AQCR 153		ABILENE-WICHITA FALLS AQCR 210		AMARILLO-LUBBOCK AQCR 211		AUSTIN-WACO AQCR 212		BROWNSVILLE-LAREDO AQCR 213		CORPUS CHRISTI-VICTORIA AQCR 214		METRO-DALLAS-FT. WORTH AQCR 215		METRO-HOUSTON-GALVESTON AQCR 216		METRO SAN ANTONIO AQCR 217		MIDLAND-ODESSA SAN ANGELO AQCR 218	
	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2
• Does the State have air quality standards which are more stringent than NAAQS?	NO	NO																								
• Does the State have emission limiting regulations for control of: 1. Power plants 2. Industrial sources 3 Area sources	YES YES NO[1]	YES YES NO[1]																								
• Did the State use an example region approach for demonstrating the attainment of NAAQS or more stringent State standards?	YES	YES																								
• Has the State not initiated action to modify combustion source emission regulations for fuel savings, i.e., under the Clean Fuels Policy?	YES	YES																								
• Are there no proposed Air Quality Maintenance Areas?			YES	YES	NO	YES	YES	YES[2]	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	NO	YES	NO	NO	YES	YES	YES	YES
• Are there indications of a sufficient number of monitoring sites within a region?			YES	YES	YES	YES	YES	YES	YES	NO	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO
• Is there an expected 1975 attainment date[3] for NAAQS?			YES	4	YES	YES	YES	YES	YES	YES	YES	YES	YES	4	YES	4	YES	YES	YES	4	YES	YES	YES	4	YES	YES
• Based on reported (1973) Air Quality Data, does air quality meet NAAQS?			NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
• Based on reported (1973) Air Quality Data, are there indications of a tolerance for increasing emissions?			NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
• Are the total emissions from stationary fuel combustion sources lower than those of other sources?			YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
• Do modeling results for specific fuel combustion sources show a potential for a regulation revision?			← NO MODELING RESULTS AVAILABLE FOR SPECIFIC FUEL COMBUSTION SOURCES →																							
• Must emission regulations be revised to accomplish significant fuel switching?			N/A[5]	NO[6]	N/A[5]	NO[6]	N/A[5]	NO[6]	N/A[5]	NO[6]	N/A[5]	NO[6]	N/A[5]	NO[6]	N/A[5]	NO[6]	N/A[5]	NO[6]	N/A[5]	NO[6]	N/A[5]	NO[6]	N/A[5]	NO[6]	N/A[5]	NO[6]
• Based on the above indicators, what is the potential for revising fuel combustion source emission limiting regulations?			POOR[7]	8	POOR[7]	8	POOR[7]	8	POOR[7]	8	POOR[7]	8	POOR[7]	8	POOR[7]	MARGINAL 9	POOR[7]	8	POOR[7]	8	POOR[7]	10	POOR[7]	8	POOR[7]	8
• Is there a significant Clean Fuels Saving[11] potential in the region?			NO[12]	YES[13]	NO[12]	YES[13]	NO[12]	YES[14]	NO[12]	YES[13]	NO[12]	YES[13]	NO[12]	YES[13]	NO[12]	YES[13]	NO[12]	YES[13]	NO[12]	YES[13]	NO[12]	YES[15]	NO[12]	YES[13]	NO[12]	YES[13]

STATE IMPLEMENTATION PLAN REVIEW (SUMMARY TABLE) - TEXAS (Continued)

[1]Though the answer to this question is not clear cut, the "NO" response was chosen because it appears that most area sources would not be subject to the State's emission limiting regulations. Equipment used for domestic residences, or for other domestic purposes have been specifically exempted from the State's regulations. However, it would also appear that area sources not in this category would be subject to the regulations.

[2]This AQCR had originally been proposed as an AQMA for SO_2, but based on recent thinking of EPA in Region VI, it is unlikely that it will be promulgated.

[3]These responses are based on information gathered at the time the Plan was approved, from data published in the Federal Register. EPA and the State of Texas are currently evaluating the prospect of revising these dates.

[4]Ambient air quality was below NAAQS when attainment dates were formalized.

[5]Since it cannot be determined whether the emission regulations are being violated or not, this question is not answerable.

[6]Even though it cannot be determined whether sources are in compliance with the emission regulation, air quality data suggests that significant fuel switching could be accomplished without relaxing the regulation. The validity of this statement is based on the assumption that the State's SO_2 regulation is being rigidly enforced.

[7]Due to the NAAQS violations in this AQCR, there are indications of little potential for TSP regulation relaxation.

[8]Based on air quality, there are indications of increasing the SO_2 emissions in this AQCR. However, it is impossible to determine whether the low ambient SO_2 levels are due to a low emission rate, low sulfur content in the fuels being used, or to overly restrictive SO_2 regulations.

[9]This "MARGINAL" classification is based on the lack of SO_2 air quality data for this AQCR.

[10]Based on air quality, there are indications of increasing the SO_2 emissions outside of Galveston County only, since this county is expected to be designated as a SO_2 AQMA. Due to the proposed AQMA, this Region as a whole would be a Poor candidate for regulation relaxation.

[11]The extent to which a region has a potential for Clean Fuel Savings is dependent on the air quality of that region, and the number of sources in this AQCR which have a dual fuel (gas and oil) capability. Information for industrial sources seems to be incomplete, so responses to this question will refer primarily to the State's power plants.

[12]Due to NAAQS violations, there seems to be no potential for Clean Fuel Savings which involve increases in TSP emissions.

[13]Most AQCRs have a number of power plants which have shown an ability to use both gas and oil. In that SO_2 air quality does not pose a constraint, these sources could represent a significant potential for Clean Fuel Savings involving increases in SO_2 emissions. But because of the State's TSP situation, any such increases would have to occur without corresponding increases in particulate emissions.

[14]While there may be additional industrial sources not accounted for in this review, available information shows only one power plant (266MWe) in this AQCR which has a dual fuel (oil and gas) capability.

[15]In this AQCR, Galveston County is expected to be designated as an AQMA for SO_2. Therefore, the significant Clean Fuel Savings potential for this AQCR would have to be confined to the area outside of this county.

2.2 AIR QUALITY SETTING FOR THE STATE OF TEXAS

The State of Texas is one of five states in EPA Region VI. (The others are Arkansas, Louisiana, New Mexico and Oklahoma.) Texas is divided into twelve AQCRs. These are listed below:

022 - (XII) - Shreveport - Texarkana - Tyler Interstate
106 - (X) - Southern Louisiana - Southeast Texas Interstate
153 - (XI) - El Paso - Las Cruces - Alamogordo Interstate
210 - (I) - Abilene - Wichita Falls Intrastate
211 - (II) - Amarillo - Lubbock Intrastate
212 - (III) - Austin - Waco Intrastate
213 - (IV) - Brownsville - Laredo Intrastate
214 - (V) - Corpus Christi - Victoria Intrastate
215 -(VIII) - Metropolitan Dallas - Fort Worth Intrastate
216 - (VII) - Metropolitan Houston - Galveston Intrastate
217 - (IX) - Metropolitan San Antonio Intrastate
218 - (VI) - Midland - Odessa - San Angelo Intrastate

The boundries of an AQCR are designed to enclose an airshed. Three of Texas' AQCRs have boundries which cross state lines, (i.e. are interstate AQCRs).

The three digit number in the above listing has been assigned by EPA as part of a nationwide numbering system for all AQCRs. The Roman numeral in parentheses is used by the State of Texas for designating air quality control regions within its boundries. So while the numbers 022, 106 and 153 correspond to federal air quality control regions which span the boundries of more than one state, the Roman numerals XII,X and XI correspond only to the respective portions of those AQCRs that are within Texas. For the intrastate AQCRs, the two numbering systems designate identical areas. The SIP uses the Roman numeral system almost exclusively in reference to the various regions.

Tables A-1, A-2 and A-3 summarize additional general information which characterizes the air quality, and provides other related parameters in the AQCRs. In Table A-1 the following information is presented:

1) Priority classifications for the pollutants under study

2) Demographic data

3) Counties within the State which are proposed Air Quality Maintenance Areas (AQMAs)

Priority classifications give an indication of the extent to which certain pollutants pose air quality problems for the AQCR. A Priority I listing indicates that relatively high ambient concentrations have been either observed, estimated (in the absence of adequate measured air quality data), or predicted (due to the expected presence of future sources). A Priority III designation is used when pollutant concentrations are generally lower than NAAQS. A Priority II designation indicates intermediate pollutant levels.

With respect to the pollutants under study, Table A-1 shows that four of the State's AQCRs are classified Priority I for particulates, while the rest are Priority II. Priority I classifications for SO_2 apply to five AQCRs. Two additional AQCRs are classified Priority II for this pollutant, while the remaining five are Priority III.

The demographic characteristics of the AQCRs are included in Table A-1 to further describe the various regions.

Table A-2 presents the dates when the ambient level of the pollutants under study is expected to be within the limits set by NAAQS. These dates were established at the time the original SIP was approved; however, in some cases EPA and the State are currently considering amending these dates.

A summary of the federal ambient air quality standards for the pollutants under study is presented in Table A-3. The state's air quality standards are stipulated under Rule 24. It is stated that the National primary and secondary ambient air quality standards are applicable throughout the State.

Proposed Air Quality Maintenance Area (AQMA) designations are a way of identifying those areas in the State which, due to current air quality and/or projected growth rate, may have the potential for exceeding any national

standard within the ten year period 1975-1985. These designations are proposed by either the State, or by the Regional EPA office. If an area ultimately becomes an AQMA, it is likely that more restrictive changes will have to be made to existent regulations and/or air pollution control plans. From Table A-1, it can be seen that a total of 23 counties are involved in proposed TSP AQMAs. The four AQCRs which contain these counties are Metropolitan Houston-Galveston (216), Southern Louisiana-Southeast Texas (106), Corpus Christi-Victoria (214), and Metropolitan Dallas-Fort Worth (215). There is only one county which is proposed as an AQMA for SO_2, and this is Galveston County in the Houston-Galveston AQCR (216).

The data in Tables A-4 and A-5 provide a picture of the State's recent (1973) air quality setting. Table A-4 shows particulate matter problems with NAAQS violations occurring in every AQCR.

Those air quality levels which were reported in 1973 for SO_2 show low concentrations. Though all measured 1973 values were below NAAQS, the highest value was recorded in the El Paso-Las Cruces-Alamogordo AQCR (153). This and one other AQCR had SO_2 levels that were higher than those measured in the Example Region (Metropolitan Houston-Galveston). The Brownsville-Laredo AQCR had no reported SO_2 air quality data for 1973.

With regards to TSP readings in the Example Region, air quality data measured in 1973 cannot reflect the full effect of Texas' air pollution control strategies because final compliance to the State's emission limitations was not due until December 1973.

Within Texas more than 1/3 of the State's particulate emissions are produced by two AQCRs. These are the Texas portion of Shreveport-Texarkana-Tyler (022) and Metropolitan Houston-Galveston (216), and each make almost equal contributions. The most current emissions data available (namely 1972 data obtained from NEDS data bank December 1974) was used to compile the information presented in Tables A-6 and A-7. Particulate emissions are shown in Table A-6. No one AQCR has more than 20% of its particulate

standard within the ten year period 1975-1985. These designations are proposed by either the State, or by the Regional EPA office. If an area ultimately becomes an AQMA, it is likely that more restrictive changes will have to be made to existent regulations and/or air pollution control plans. From Table A-1, it can be seen that a total of 23 counties are involved in proposed TSP AQMAs. The four AQCRs which contain these counties are Metropolitan Houston-Galveston (216), Southern Louisiana-Southeast Texas (106), Corpus Christi-Victoria (214), and Metropolitan Dallas-Fort Worth (215). There is only one county which is proposed as an AQMA for SO_2, and this is Galveston County in the Houston-Galveston AQCR (216).

The data in Tables A-4 and A-5 provide a picture of the State's recent (1973) air quality setting. Table A-4 shows particulate matter problems with NAAQS violations occurring in every AQCR.

Those air quality levels which were reported in 1973 for SO_2 show low concentrations. Though all measured 1973 values were below NAAQS, the highest value was recorded in the El Paso-Las Cruces-Alamogordo AQCR (153). This and one other AQCR had SO_2 levels that were higher than those measured in the Example Region (Metropolitan Houston-Galveston). The Brownsville-Laredo AQCR had no reported SO_2 air quality data for 1973.

With regards to TSP readings in the Example Region, air quality data measured in 1973 cannot reflect the full effect of Texas' air pollution control strategies because final compliance to the State's emission limitations was not due until December 1973.

Within Texas more than 1/3 of the State's particulate emissions are produced by two AQCRs. These are the Texas portion of Shreveport-Texarkana-Tyler (022) and Metropolitan Houston-Galveston (216), and each make almost equal contributions. The most current emissions data available (namely 1972 data obtained from NEDS data bank December 1974) was used to compile the information presented in Tables A-6 and A-7. Particulate emissions are shown in Table A-6. No one AQCR has more than 20% of its particulate

emissions derived from fuel combustion sources, and on a statewide basis, 91% of the particulates are estimated to come from sources other than fuel combustion.

Three of the AQCRs within Texas together account for 60% of the State's SO_2 emissions. These are Metropolitan Houston-Galveston (216), and the Texas portions of El Paso-Las Cruces-Alamogordo (153) and Southern Louisiana-Southeast Texas AQCRs. Respectively, these areas produce 22%, 22% and 17% of the State's total SO_2 emissions. In most of the State's AQCRs, fuel combustion at stationary sources also provides only a small proportion of the AQCR's total SO_2 emissions. However, in the Austin-Waco AQCR (212), stationary source fuel combustion provides 80% of all of the SO_2 inventoried for that AQCR. This amount corresponds to 7% of all SO_2 emissions in the State. Metropolitan Dallas-Fort Worth is the only other AQCR in which fuel combustion from stationary sources provides greater than 20% (27.7%) of the AQCR's total SO_2 emissions. Statewide, 89% of the SO_2 emissions are due to processes other than stationary fuel combustion sources.

2.3 BACKGROUND OF THE DEVELOPMENT OF THE CURRENT STATE IMPLEMENTATION PLAN.

From even before 1965, agencies within Texas had responsibilities for investigating and controlling atmospheric pollution. Additional authority for air pollution control activities were obtained via the Clean Air Act of Texas was first passed in 1965. In 1967, this legislation was strengthened, and renamed as the Texas Clean Air Act. It was again strengthened in 1969. The responsibility for the control and abatement of air pollution in Texas lies with the Texas Air Control Board. The Board fulfills this responsibility by adopting the rules and regulations which are considered necessary. The purpose of the State's SIP is to fulfill the minimum requirements specified in the Federal Register 158, and to show that NAAQS can be attained in the prescribed time limit.

Using 1969 air quality and emissions data, the SIP summarizes the development of control strategies for particulates and SO_2, as well as for other pollutants. As mentioned earlier, the Metropolitan Houston-Galveston AQCR (216)

was used as the Example Region for this process. But because the sulfur oxide emissions from the El Paso-Las Cruces-Alamogordo AQCR (153) were sufficiently different from those in the Example Region, a separate control strategy demonstration was also presented for this region.

Table A-8 provides a summarization of the particulate and SO_2 emission limiting regulations that would apply to the State's stationary fuel combustion equipment. For particulates there are essentially two sets of regulations; one which applies generally to visible emissions, and a second regulation that is directed specifically at particulate matter. The regulation for visible emissions corresponds to Rule 103 and is expressed in terms of the percent opacity of the emission under varying conditions. The other regulation for particulates corresponds to Rule 105, and it has three sections. The first section states the allowable emission limit in terms of effluent flow rates. That is, the allowable limit of particulates is determined by a mathematical relationship with the volume rate (acfm = actual cubic feet per minute) of gases going up the stack. It also appears that this regulation requires an across the board reduction in emissions depending on the relationship between two parameters associated with the stack height. The second section of this regulation states the limit in terms of ambient air concentration maximums observable beyond the premises where the source is located. Limits stated in this manner are sometimes referred to as "property line regulations", and they are often considered to have inherent enforcement problems.

The third section excludes solid fossil fuel fired steam generators from the limitations of the other two sections, and sets another control value for this type of equipment. This control value is stated in the format normally used for fuel burning equipment, (that is, by prescribing the number of pounds of pollutant than can be emitted for every 10^6 Btu of energy produced).

Based on the way the regulation is written, it seems that any installation that is subject to the stipulations of the first section would also be subject to the second section and visa versa. Thus for full compliance, the applicable limits for neither of these two sections should be exceeded.

The regulation for the control of SO_2 is Rule 201, and it has a number of sections. Some of these sections state limits for specific sources such as sulfuric acid plants, sulfur recovery plants and non-ferrous smelters. Those sections of this regulation which are applicable to stationary fuel burning equipment are shown in Table 8. The first of these sections apply to solid fossil fuel fired steam generators. Its limit is stated using the convenient pounds/million Btu format. The second section applies specifically to liquid fuel fired generators, furnaces or heaters, and it places a concentration limit presumably on the stack emissions. This section also mandates emission reductions depending on various stack height parameters. The remaining three sections give limits for non-specific SO_2 sources in terms of ambient air SO_2 concentrations. Two sections stipulate differing limits for different counties, while the third section apparently applies to the non-specific sources in the rest of the State.

The SIP demonstrated the attainment and maintenance of national particulate standards via the application of the State's emission limiting regulations to major point (and where applicable area) sources in the Example Region, and then using AQDM to provide predictions of the resulting air quality. The regulations used in this demonstration were those covering outdoor burning (Rule 101), incineration (Rule 102), visible emissions (Rule 103), particulate matter from material handling, construction and roads (Rule 104), general particulate matter (Rule 105), transient operations (Rule 106), and agricultural processes (Rule 107).

Before application of the limits of these regulations, an ambient particulate level of 92 ug/m^3 annual geometric mean (AGM) was estimated. The level predicted after application of emission controls was 55 ug/m^3 (AGM). Since this prediction was based on 1969 data, it did not take into account the growth that would take place between then and the prescribed attainment date in 1975. Therefore, this growth effect was factored in, and the resulting air quality was predicted to be 56 ug/m^3 (AGM) which is below the Federal secondary standard for this pollutant.

In preparing the AQDM predictions, a value of 25 ug/m^3 was utilized as the background particulate concentration. This value was based on the air quality in Matagorda County (located in the Example Region) which contains only minor sources of man-produced particulates.

For SO_2 the Miller-Holzworth model was applied to the major sources in the Example Region, and this produced an air quality estimate of 70 ug/m^3 annual arithmetic mean (AAM). Using this value in a proportional rollback model, it was shown that a 14.3% reduction in SO_2 emissions would be required to attain and maintain secondary standards. (Note: This percentage reduction is based on 60 ug/m^3 as the secondary annual standatd for SO_2. This value has since been rescinded. The current annual standard for SO_2 is 80 ug/m^3.) To evaluate the control strategy for SO_2, the State's SO_2 emission limitations were applied to 62 of the major sources in the Metropolitan Houston-Galveston AQCR. The twenty largest of these facilities were responsible for 99% of the Region's total SO_2 emissions. These regulations resulted in a 31.5% reduction in emissions (a total of 55,700 tons per year). An ambient level of 48 ug/m^3 (AAM) was predicted as the corresponding resulting air quality. Five years of growth would produce an increase in this level to 49 ug/m^3 (AAM).

The demonstration of the SO_2 control strategy for the El Paso-Las Cruces-Alamogordo AQCR involved use of the 1300 ug/m^3 secondary 3-hour standard instead of the annual standard. A value of 1900 ug/m^3 was the highest 3-hour value representing the then current emission levels. A proportional rollback calculation shows a 31.6% emission reduction would be required to meet the 3-hour standard. The SIP indicates that the State's controls on the major sources in this AQCR will result in an overall emission reduction of 43%. Thus NAAQS would be achieved.

While it is stated in the SIP that the effective date for these regulations covering particulate and SO_2 emissions is March 6, 1972, it is also mentioned that the State's sources are programmed to be in compliance with these regulations by December 1973. Thus the State will have approximately 1 1/2 years of the regulation - based emission limitations before the prescribed July 1975 attainment date is reached.

2.4 SPECIAL CONSIDERATIONS

Due to the combined effect of two major factors, it is impossible, within the context of this review, to accurately determine the extent to which most of the State's individual stationary sources are in compliance with the applicable regulations. Consequently, it is also impossible to definitively evaluate the restrictiveness of these regulations in these cases. The two major factors involved are (1) the general formats of Texas' regulations, and (2) the types of data on individual sources made available for this review. Because of this situation, the only regulations that can be evaluated are those which express the emission limit in terms of pounds of pollutant per million Btu of heat input. For Texas this consists of the particulate and SO_2 regulations for solid fossil fuel fired steam generators. Based on available information, Texas has only one stationary facility which used a solid fossil fuel during 1972 and 1973. Two additional facilities presently burn solid fossil fuel. However, even though the evaluation of the restrictiveness of the Station's emission regulations is effectively precluded by the above described situation, it should be noted that it is possible to use air quality data to help identify areas which may be candidates for increased emission, and in thereby effect clean fuel savings.

Texas is currently in the process of revising the emission regulations for the smelter in El Paso. Though this would not have a direct bearing on fuel burning equipment, it does represent an SIP change which may have some effect on air quality.

At the time the plan was approved, El Paso County in the El Paso-Las Cruces-Alamogordo AQCR was listed as a proposed AQMA for SO_2. But based on recent thinking of EPA Region VI, it appears unlikely that this region will be promulgated. However, it is expected that Galveston County (in the Houston-Galveston AQCR (216)), will be promulgated as a SO_2 AQMA.

The attainment dates shown in Table A-2 were based on information published in the Federal Register. However, after a recent analysis of air quality data, EPA and the State of Texas are currently evaluating the prospect of revising these dates.

3.0 AQCR ASSESSMENT

3.1 REGIONAL AIR QUALITY

Factors relating to the format of Texas' emission regulations have precluded evaluation of their restrictiveness within the context of this review. Neither the visible emissions regulation, nor the "property line" format of portions of Texas' particulate and SO_2 regulations is amenable to the SIP review.

Tables A-4 and A-5 present the air quality status for TSP and SO_2 in Texas. Tables A-9 and A-10 show estimates of emission tolerance based on a proportional model of emissions to 1973 air quality data. This display should be viewed in light of the limitations mentioned in Section 1.0 The portion of these tables that apply to SIP information was included as a means of summarizing the emission control goals of the State. However, the detailed information necessary for this type of anlysis was not made available for this review.

Tables B-1 and B-2 are summaries of a number of the indicators which should be considered when estimating the potential for fuel switching to achieve clean fuel savings.

Based on the information presented in Tables A-9 and B-1, increases in particulate emissions would tend to aggravate an air quality situation which is typified by TSP violations in each of the State's AQCRs.

With the exception of Galveston County, where recent air quality indicates a need for air quality maintenance, and the Brownsville-Laredo AQCR, which had no 1973 air quality data for SO_2, each of Texas' AQCRs have a tolerance for increased SO_2 emissions without violating NAAQS (see Tables A-10 and B-2). To determine an allowable level of increased emissions would require an analysis involving diffusion modeling. However, it should be noted that most of the fuel switches that would increase SO_2 emissions (i.e., use of higher sulfur oil or coal instead of gas) would also produce corresponding increases in particulate emissions, and thus further aggravate the State's TSP situation.

3.2 STATEWIDE FUEL USE FOR POINT SOURCES

Table B-3 shows that the major fuels in the state can be categorized as natural gas, oil and wood. The figures involving the wood category utilize an average heat content of 5000 Btu/lb. The heat values of materials in this category vary widely depending on their composition and moisture content. However, since the heat contents for relatively dry wood typically range between 6000 and 8000 Btu/lb, the 5000 Btu/lb figure appears to be a relatively conservative estimate. Due to the variability of heat values, moisture content, and resultant emissions of the individual fuels in this category, the 5000 Btu/lb estimate has been used solely in those calculations aimed at providing a first approximation of the relative importance of these materials as fuels within Texas.

3.3 POWER PLANT ASSESSMENT

The tables that comprise Appendix C provide a listing of the power plants in the State along with a general description of each plant's emission characteristics. This listing and information was obtained from the NEDS data on individual sources.

As shown in Table C-1, Texas has a total of 73 power plants. Information from the Steam-Electric Plant Factors publication show that their installed generating capacity varies from 25 megawatts electric (Mwe) to 1550 Mwe. The State's total capacity is 32,274 Mwe.

The State's largest generating capacity power plant (1550 Mwe) is located in the Metropolitan Houston-Galveston AQCR and it has a total hourly heat input of $10{,}351 \times 10^6$ Btu. The Steam-Electric Plant Factors publication indicates that 65 of Texas' 73 power plants were designed to utilize natural gas and/or oil as a fuel, while of the remaining eight plants, seven were designed for natural gas only. One plant was designed to use solid fuel and/or gas. The 1973 fuel schedule of this plant consisted entirely of lignite. More recent information shows that there are currently (1975) a total of three power plants in Texas which burn lignite.

Natural gas provides overwhelmingly the major segment of heat input to the power plants identified in Appendix C. Of the total $152{,}092 \times 10^6$ Btu/hr heat input supplied to these facilities, $138{,}161 \times 10^6$ Btu/hr (or 90.8%) is produced by natural gas. The State's lignite burning facility

accounts for 5% of the total heat input to power plants. The remaining 4.2% is spread among the 63 power plants which use oil as a fuel. Of these 63 plants, only one uses oil exclusively; the rest combine their oil use with natural gas.

The Metropolitan Dallas-Fort Worth AQCR (215) contains the largest number of power plants (15), while the Example Region (Metropolitan Houston-Galveston) has 11. However, the heat input to this smaller number of plants is 35% greater than the heat input to the 15 power plants in the Metropolitan Dallas-Fort Worth AQCR.

For most of the power plants in Table C-1 an "allowable" level of particulate emissions is noted. This value was obtained directly from Table A-8a which shows the allowable particulate emissions rates that correspond to various stack effluent flow rates. These allowable values would apply only if the source has an effective stack height which is greater than (or equal to) the standard effective stack height. (See the particulate matter regulation in Table A-8 for definition of these terms.) However, if this is not the case, then the allowable emission levels shown in Table A-8a, (and therefore, in Table C-1) would have to be reduced by a factor obtained with the equation shown in Table A-8. Data was not available to allow for computation of the effective stack height, so any reductions that may be required could not be calculated. Therefore, the "allowable" values shown in Table C-1 represent the applicalbe limit only in the certain special cases mentioned above.

The portions of Texas' particulate and SO_2 emission control regulations for steam generators using solid fossil fuel lends itself to the type of analysis being used in this review. Available information indicates the only major source in the State that would be subject to these limits (a lignite burning power plant in the Austin-Waco AQCR (212), is exceeding the established limits for particulates.

The fact that the majority of Texas' power plants use both oil and natural gas increases the potential for fuel switches aimed at clean fuel savings. However, air quality data shows that increasing particulate emissions should be avoided. Increasing the particulate emission level would tend to aggravate the State's problem of NAAQS TSP violations.

3.4 INDUSTRIAL/COMMERCIAL/INSTITUTIONAL SOURCE ASSESSMENT

Table D-1 presents the pertinent fuel combustion data for point sources in the industrial/commercial/institutional sector (commonly referred to as the industrial sector in this review). This information was obtained from NEDS emission data for the individual sources.

Appendix D shows a total of eight specific industrial fuel burning sources within the State of Texas. Considering the physical expanse of the State, its industrial activity, and the large number of power plants as listed in Appendix C, it is likely that the data listing for industrial sources made available for this study was incomplete.

3.5 AREA SOURCE ASSESSMENTS

For the State of Texas, area sources offer little, if any, potential for achieving clean fuel savings within the context of this review.

APPENDIX A

- State implementation plan information
- Current air quality information
- Current emissions information

Tables in this appendix summarize original and modified state implementation plan information, including original priority classifications, attainment dates, ambient air quality standards, and fuel combustion emission regulations. SAROAD data for SO_2 and TSP monitoring stations are shown for AQCRs in the State. NEDS emissions data by AQCR[1] are tabulated and broken down into fuel burning categories.

Tables A-9 and A-10 show a comparison of emission inventories in the original SIP and those from the NEDS. An emission tolerance, or emission tonnage which might be allowed in the AQCR and still not violate national secondary ambient air quality standards, is shown for SO_2 and particulates. The intent of this calculation is to indicate possible candidate regions for fuel switching. Tolerance was based on either the degree of control expected by the SIP or upon air quality/emission relationships which are calculated from more recent data. The value of the emission tolerance provides an indication of the degree of potential an AQCR possesses for fuel revisions and regulation relaxation.

Methodology for Increased Emissions Tolerance

A tolerance for increased emissions was determined as follows: The "allowable emissions" were calculated for each AQCR based on 1972 NEDS data and the percent reduction (or increase) required to meet the national secondary ambient air quality standards in that AQCR (worst case from Tables A-4 and A-5).

The percentages used in this calculation were obtained via the use of current 1973 air quality data and the proportional rollback model. The values for background TSP concentrations were the same as those used in the SIP. This background value was used in all calculations involving the annual standard, but a zero TSP background was assumed for the calculation of reductions based on the 24-hour standard. (This was done because background levels are, in effect, an annual average, and therefore, should be

[1] "1972 National Emissions Report," EPA - 450/2-74-012, June 1974.

compared with only annual data. It is reasonable to expect that the "real background" for any particular 24-hour period to be different for other 24-hour periods.)

The NEDS emissions are subtracted from the "allowables" to determine the tolerance for emissions increase. A positive value for this result indicates a potential for increasing emissions.

When the current air quality levels were less than one-half of the level represented by an ambient air quality standard, no "rollup" emissions tolerance was calculated in Tables A-9 and A-10. This arbitrary cutoff point was chosen so as not to distort the emissions tolerance for an area. At low levels of a pollutant, the relationship between emissions and air quality is probably not linear. Although this cutoff may leave some AQCRs with no quantifiable emissions tolerance, it was felt that no number at all would be preferable to a bad or misleading number.

It is emphasized that emissions tolerance is a region-wide calculation. This tolerance obviously makes more sense in, say, an urban AQCR with many closely spaced emissions sources than in a largely rural AQCR with geographically dispursed emissions.

A word of caution regarding particulates needs mentioning. Emission source estimates in the NEDS data bank and most state SIP's are for total particulates. Generally, the control strategies for particulates are aimed at total particulates, while the high-volume particulate sampling (SAROAD data) measures only the finer, suspended fraction. A given level of total particulate emissions control will therefore not translate into the same level of measured ambient air quality. Some of the larger particulates being controlled will not remain suspended, and therefore would not be measured by the High-volume technique. Hence, particulate control plans may have underestimated the amount of control necessary to achieve ambient air quality standards.

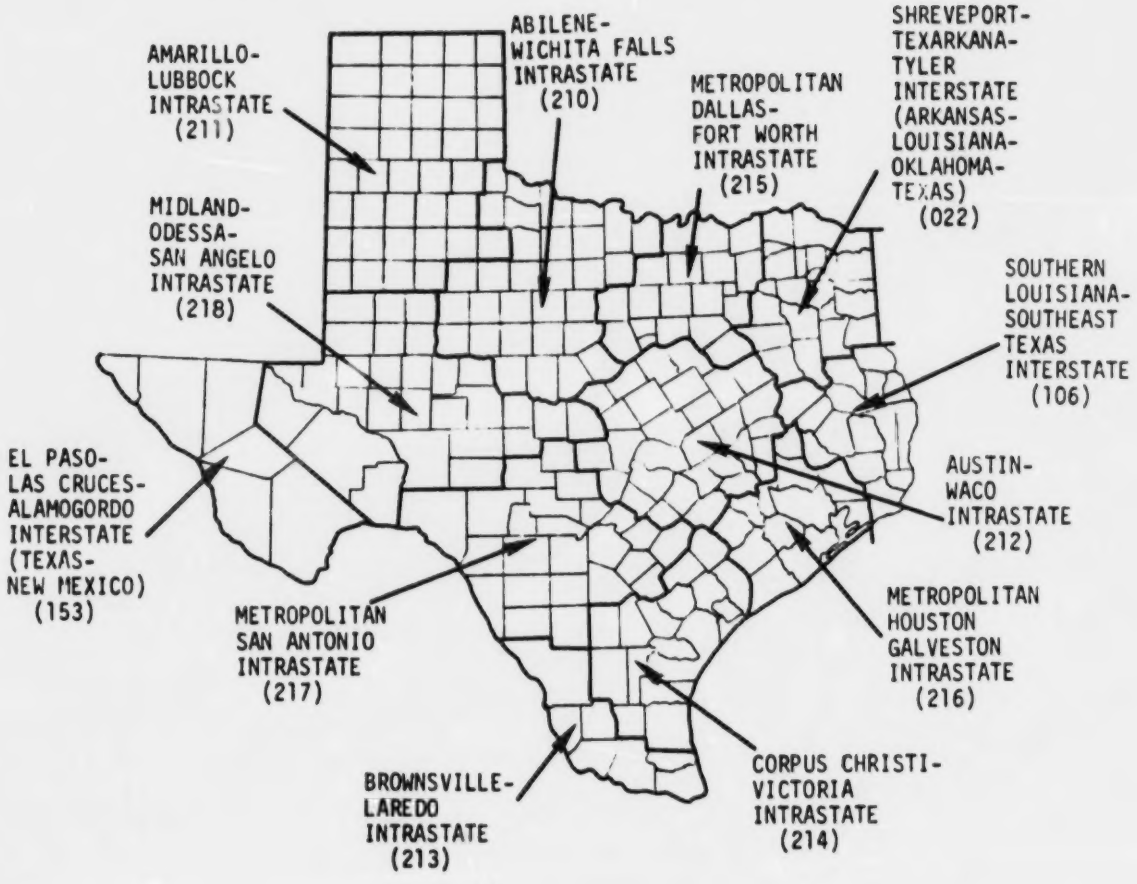

Figure A-1. Air Quality Control Regions in Texas

Table A-1. AQCR Priority Classification and AQMAs - Texas

AQCR	Federal #	State #	Priority Classification [c] Part. [e]	SO_x	NO_x	Demographic Information [b] Population 1970	Square Miles	Population Density	Proposed AQMA Designations [d] TSP Counties	SO_x Counties	NO_x Counties
Shreveport-Texarkana-Tyler [a]	022	12	II	III	III	638,365	15,761	40.5	(0)	(0)	
Southern Louisiana - Southeast Texas [a]	106	10	II	I	III	561,775	12,298	45.7	(3) Orange, Jefferson, Hardin	(0)	
El Paso-Las Cruces-Alamogordo [a]	153	11	I	I	III	379,261	21,778	17.4	(0)	(0)	
Abilene-Wichita Falls	210	1	II	II	III	492,609	28,029	17.6	(0)	(0)	
Amarillo-Lubbock	211	2	II	I	III	658,093	38,656	17.0	(0)	(0)	
Austin-Waco	212	3	II	III	III	1,004,282	24,633	40.8	(0)	(0)	
Brownsville-Laredo	213	4	I	III	III	437,045	9,662	45.0	(0)	(0)	
Corpus Christi-Victoria	214	5	I	I	III	546,364	16,475	33.0	(2) Nueces, San Patricio	(0)	

Table A-1. AQCR Priority Classification and AQMAs - Texas (Con't)

AQCR	Federal #	State #	Priority Classification [c]			Demographic Information [b]			Proposed AQMA Designations [d]		
			Part. [f]	SO_x [e]	NO_x [g]	Population 1970	Square Miles	Population Density	TSP Counties	SO_x Counties	NO_x Counties
Metropolitan Dallas - Fort Worth	215	8	II	III	III	2,636,374	15,362	171.6	(11)Collin, Dallas, Denton, Ellis, Hood, Johnson, Kaufman, Parker, Rockwell, Tarrant, Wise	(0)	
Metropolitan Houston-Galveston	216	7	I	I	III	2,305,106	12,428	185.5	(7)Brazoria Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller	(1)Galveston	
Metropolitan San Antonio	217	9	II	III	III	1,124,600	28,954	39.0	(0)	(0)	
Midland-Odessa-San Angelo	218	6	II	II	III	412,856	38,794	10.6	(0)	(0)	

[a] Interstate

[b] For Interstate AQCR's, information given is for the Texas portion of the AQCR only. 1970 U.S. Census Information.

[c] Criteria based on maximum measured (or estimated) pollution concentration (ug/m^3) in area

(Footnotes continued on next page)

[d] Federal Register, August 1974, SMSA's showing potential for NAAQS violations due to growth. Proposed designations as indicated in the Proposed Air Quality Maintenance Designations for Texas: Background and Rationale, EPA, Region VI.

Priority	I	II	III
	Greater than	From - to	Less than
[e] Sulfur oxide			
Annual arithemetic mean	100	60 - 100	60
24-hour maximum	455	260 - 455	260
[f] Particulate matter			
Annual geometric mean	95	60 - 95	60
24-hour maximum	325	150 - 325	150
[g] Nitrogen dioxide	110		110

Table A-2. Attainment Dates - Texas

AQCR #	AQCR Name	Particulates Attainment Dates		Sulfur Dioxide Attainment Dates		Nitrogen Oxides Attainment Dates
		Primary	Secondary	Primary	Secondary	
022	Shreveport - Texarkana - Tyler [b]	7/75	7/75	a	a	a
106	Southern Louisiana - Southeast Texas [b]	7/75	7/75	7/75	7/75	a
153	El Paso - Las Cruces - Alamogordo [b]	7/75	7/75	7/75	7/75	a
210	Abilene -Wichita Falls	7/75	7/75	7/75	7/75	a
211	Amarillo - Lubbock	7/75	7/75	7/75	7/75	a
212	Austin - Waco	7/75	7/75	a	a	a
213	Brownsville - Laredo	7/75	7/75	a	a	a
214	Corpus Christi - Victoria	7/75	7/75	7/75	7/75	a
215	Metropolitan Dallas - Fort Worth	7/75	7/75	a	a	a
216	Metropolitan Houston - Galveston	7/75	7/75	7/75	7/75	a
217	Metropolitan San Antonio	7/75	7/75	a	a	a
218	Midland - Odessa - San Angelo	7/75	7/75	7/75	7/75	a

[a] Ambient air quality standards below NAAQS when SIP was submitted

[b] Interstate

[c] Based on information gathered at the time the Plan was approved from data published in the Federal Register. EPA and the State of Texas are currently evaluating the prospect of revising these dates.

Table A-3. Ambient Air Quality Standards - Texas

(Expressed as $\mu g/m^3$)

		Total Suspended Particulate		Sulfur Oxides			Nitrogen Dioxide
		Annual	24-Hr.	Annual	24-Hr.	3-Hr.	
Federal	**Primary**	75 (G)	260 [a]	80 (A)	365 [a]	-	100 (A)
	Secondary	60 (G)	150 [a]	-	-	1300 [a]	100 (A)
Texas		Identical to Federal Standards					

(A) = Arithemetic mean

(G) = Geometric mean

[a] Not to be exceeded more than one time a year

Table A-4 Texas AQCR Air Quality Status, TSP [a]

AQCR Name	AQCR #	# Stations Reporting	TSP Concentration ($\mu g/m^3$) Highest Reading Annual	Highest Reading 24-Hr	2nd Highest Reading 24-Hr	# Stations Exceeding Ambient Air Quality Standards Primary Annual	Primary 24-Hr[c]	Secondary Annual	Secondary Annual %	Secondary 24-Hr[c]	Secondary 24-Hr %	% Reduction[d] Required to Meet Standards	Standard on Which % Reduction Is Based
Shreveport-Texarkana	022[b]	11	81	560	168	1	0	3	27	4	36	38	annual
Tyler	(Texas)	3	62	132	107	0	0	1	33	0	0	5	annual
Southern Louisiana-S.E. Texas	106[b] (Texas)	18 12	136 136	747 747	505 505	3 2	1 1	9 8	50 67	7 5	39 42	70 70	24-hr 24-hr
El Paso-Las Cruces Alamogordo	153[b] (Texas)	32 25	190 190	907 907	713 713	16 14	11 10	20 17	62 68	23 20	72 80	79 79	24-hr either*
Abilene-Wichita Falls	210	3	98	265	200	1	0	2	67	2	67	52	annual
Amarillo-Lubbock	211	18	79	349	269	1	1	1	6	11	61	48	24-hr
Austin-Waco	212	12	87	366	175	2	0	3	25	3	25	44	annual
Brownsville-Laredo	213	6	114	1302	424	2	2	3	50	3	50	65	24-hr
Corpus Christi-Victoria	214	19	93	472	462	2	1	6	32	5	26	68	24-hr
Metro. Dallas-Ft. Worth	215	42	104	542	276	6	2	15	36	12	29	56	annual
Metro. Houston Galveston	216	60	116	1447	1107	21	1	35	58	20	33	66	24-hr
Metro. San Antonio	217	12	94	287	230	2	0	4	33	4	33	49	annual
Midland-Odessa-San Angelo	218	5	67	392	314	0	1	2	40	2	40	52	24-hr

[a] 1973 air quality data in National Air Data Bank as of June 7, 1974.

[b] Interstate.

[c] Violations based on 2nd highest reading at any station.

[d] Formula : $\frac{\text{2nd Highest 24 hr - 24 hr Secondary Standard}}{\text{2nd Highest 24 hr}} \times 100$ or $\frac{\text{Annual - Annual Secondary Standard}}{\text{Annual - Background}} \times 100$

Note : Annual background = 25 $\mu g/m^3$; 24 hr background assumed to be 0 $\mu g/m^3$

* % rollback is identical with respect to either the annual or 24 hr standard.

Table A-5. Texas AQCR Air Quality Status (1973), SO_2[a]

AQCR Name	AQCR #	# Stations Reporting 24-Hr (Bubbler)	# Stations Reporting (Contin.)	SO_2 Concentration ($\mu g/m^3$) Highest Reading Annual	Highest Reading 24-Hr	2nd Highest Reading 24-Hr	# Stations Exceeding Ambient Air Quality Stds. Primary Annual	Primary 24-Hr[c]	Secondary 3-Hr	% Reduction[d] Required To Meet Standards	Standard on Which % Reduction Is Based
1. Shreveport - Texarkana - Tyler	022[b]	7	-	7	25	13	0	0	-	e	-
	(Tex)	3	-	-	2	2	0	0	-	e	
2. So. Louisiana S.E.Texas	106[b]	1[a]	5	16	205	35	0	0	0	e	-
	(Tex)	6	1	10	205	27	0	0	0	e	
3. El Paso - Los Crucas Alamagordo	153[b]	12	1	62	390	285	0	0	0	-28	24 Hr
	(Tex)	7	1	10	179	110	0	0	0	e	
4. Abilene - Wichita Falls	210	4	-	3	11	10	0	0	-	e	-
5. Amarillo - Lubbock	211	7	-	3	22	12	0	0	-	e	-
6. Austin - Waco	212	7	-	3	9	9	0	0	-	e	-
7. Brownsville - Laredo	213	-	-	-	-	-	-	-	-	-	-
8. Corpus Christie Victoria	214	6	1	7	270	242	0	0	0	-51	24 Hr
9. Metro - Dallas - Ft. Worth	214	11	1	7	30	11	0	0	0	e	-
10. Metro. Houston Galveston	216	45	1	36	281	191	0	0	0	-91	24 Hr
11. Metro. San Antonio	217	6	-	3	10	9	0	0	-	e	-
12. Midland - Odessa San Angelo	218	5	-	3	54	12	0	0	-	e	-

[a] 1973 air quality data is National Air Data Bank as of June 7, 1974.
[b] Interstate.
[c] Violations based on 2nd highest reading at any station

[d] Formula $\left[\left(\frac{\text{2nd Highest 24 Hr} - \text{24 Hr Standard}}{\text{2nd Highest 24 Hr}} \right) \times 100, \left(\frac{\text{Annual} - \text{Annual Standard}}{\text{Annual}} \right) \times 100 \right]$

[e] The most adverse air quality reading for this AQCR is less than 1/2 the secondary standard, therefore % reductions were not calculated in order to not mislead the reader with unrealistic percentages.

SO_2 - background is assumed to be zero.

0 = data sheet available, but specific data requested was given as zero.
- = " " " " " " " " not given. Also for when data sheet not available.

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Table A-6. Texas Emissions Summary, Particulates [a]

AQCR	Total	Electrical Generation		Industrial, Commercial Institutional Point Source Fuel Combustion		Area Source Fuel Combustion		Other Sources of Particulate Emissions	
	10^3 tons/yr	10^3 tons/yr	% of Total	10^3 tons/yr	% of Total	10^3 tons/yr	% of Total	10^3 tons/yr	% of Total
Shreveport-Texarkana-Tyler [b] - Entire AQCR	162	1.2	0.7	5.9	3.6	2.3	1.4	152.8	94.3
Texas Portion	100.29	0.828	0.8	0.176	0.2	0.583	0.6	98.68	98.4
Southern Louisiana-Southeast Texas [b]									
Entire AQCR	395	3.8	0.96	30.5	7.7	5.4	1.4	355.1	89.9
Texas Portion	44.6	0.557	0.12	8.7	19.5	0.509	0.1	35.8	80.3
El Paso-Las Cruces-Alamogordo [b]									
Entire AQCR	14.2	0.23	1.6	0	0	0.27	1.9	13.7	96.5
Texas Portion	7.2	0.14	1.9	0	0	0.34	4.7	6.7	93.4
Abilene-Wichita Falls	60.2	0.62	1.0	0.01	0.02	0.73	1.2	58.8	97.8
Amarillo-Lubbock	71.3	0.55	0.77	0.29	0.41	1.9	2.7	68.5	96.1
Austin-Waco	78.1	14.2	18.2	0	0	0.88	1.1	63.0	80.7
Brownsville-Laredo	10.1	0.24	0.02	0	0	0.39	0.04	1.0	99.9
Corpus Christi-Victoria	36.0	0.51		0.28	0.78	0.52	1.4	34.7	96.4

Table A-6. Texas Emissions Summary, Particulates [a] (Continued)

AQCR	Total	Electrical Generation		Industrial, Commercial Institutional Point Source Fuel Combustion		Area Source Fuel Combustion		Other Sources of Particulate Emissions	
	10^3 tons/yr	10^3 tons/yr	% of Total	10^3 tons/yr	% of Total	10^3 tons/yr	% of Total	10^3 tons/yr	% of Total
Metro. Dallas - Ft. Worth	39.7	1.5	3.8	0.04	0.10	2.47	6.2	35.7	89.9
Metro. Houston-Galveston	106	3.2	3.0	1.8	1.7	1.97	1.9	99.0	93.4
Metro. San Antonio	30.5	0.44	1.4	0.01	0.03	0.92	3.0	29.1	95.6
Midland-Odessa-San Angelo	21.8	0.2	0.92	0.23	1.06	0.59	2.7	20.7	95.3
Emission Totals	1024.9							932.1	
Texas Total Only	605.8							551.7	

[a] 1972 emissions in data bank as of June 27, 1974

[b] Interstate

Table A-7. Texas Emission Summary, SO_2 [a]

AQCR	Total 10^3 tons/yr	Electrical Generation 10^3 tons/yr	Electrical Generation % of Total	Industrial, Commercial Institutional Point Source Fuel Combustion 10^3 tons/yr	Industrial, Commercial Institutional Point Source Fuel Combustion % of Total	Area Source Fuel Combustion 10^3 tons/yr	Area Source Fuel Combustion % of Total	Other Sources of SO_2 Emissions 10^3 tons/yr	Other Sources of SO_2 Emissions % of Total
Shreveport-Texarkana-Tyler [b]									
Entire AQCR	65.8	1.0	1.5	1.8	2.7	2.0	3.0	61.1	92.8
Texas Portion	54.3	1.0	1.8	1.2	2.2	0.99	1.8	51.2	94.2
Southern Louisiana-Southeast Texas [b]									
Entire AQCR	299	10.1	3.4	16.3	5.5	5.0	1.7	267.3	89.4
Texas Portion	137.3	0.022	0	3.1	2.2	0.894	0.6	133.4	97.2
El Paso-Las Cruces-Alamogordo [b]									
Entire AQCR	180	1.5	0.83	0.39	0.22	1.6	0.89	176.6	98.1
Texas Portion	178.7	1.1	0.6	0.39	0.2	0.558	0.3	176.7	98.9
Abilene- Wichita Falls	4.7	0.1	2.1	0	0	0.72	15.3	3.88	82.6
Amarillo-Lubbock	84.6	0.08	0.09	0.01	0.01	0.97	1.1	83.5	98.8
Austin - Waco	56.3	42.7	75.8	0	0	1.4	2.5	12.2	21.7
Brownsville-Laredo	3.3	0.01	0.3	0	0	0.6	18.2	2.7	81.5

Table A-7. Texas Emission Summary, SO_2 [a] (Continued)

AQCR	Total 10^3 tons/yr	Electrical Generation 10^3 tons/yr	Electrical Generation % of Total	Industrial, Commercial Institutional Point Source Fuel Combustion 10^3 tons/yr	Industrial, Commercial Institutional Point Source Fuel Combustion % of Total	Area Source Fuel Combustion 10^3 tons/yr	Area Source Fuel Combustion % of Total	Other Sources of SO_2 Emissions 10^3 tons/yr	Other Sources of SO_2 Emissions % of Total
Corpus Christi-Victoria	20.2	0.01	0.05	0.02	0.1	0.8	4.0	19.4	95.9
Metro. Dallas - Fort Worth	17.3	0.51	2.95	0	0	4.29	24.8	12.5	72.3
Metro. Houston-Galveston	185	8.2	4.4	12.6	6.8	3.6	1.9	160.7	86.9
Metro. San Antonio	25.3	0.03	0.12	0	0	1.6	6.3	23.6	93.6
Midland - Odessa - San Angelo	63.4	0.05	0.08	2.3	3.6	0.64	1.0	60.4	95.3
Emission Totals	1004.9							883.9	
Texas Totals Only	830.4							740.2	

[a] 1972 Emissions in data bank as of June 27, 1974

[b] Interstate

Table A-8 Texas Fuel Combustion Emission Regulations

Particulate Matter [1] (Visible Emission)

No person may cause, suffer, allow or permit visible emissions from any stationary flue to exceed an opacity of 30% averaged over a 5-minute period.

No person may cause, suffer, allow or permit visible emissions from any stationary flue beginning construction after January 31, 1972, to exceed an opacity of 20% averaged over a 5-minute period.

No person may cause, suffer, allow or permit visible emissions from any stationary flue having a total flow rate of 100,000 acfm ormore to exceed an opacity of 15% averaged over a 5-minute period unless an optical instrument capable of measuring the opacity of emissions is installed in the flue.

Particulate Matter [2]

1) No person may cause, suffer, allow or permit emissions of particulate matter from any source to exceed the allowable rates specified in Table A-8a and/or Figure A-2.

   (a) If the source has an effective stack height less than the standard effective stack height as determined in Table A-8b and/or *Figure A-3*, the allowable emission level must be reduced by multiplying it by:

$$\left(\frac{\text{Effective Stack Height}}{\text{Standard Effective Stack Height}} \right)^2$$

   (b) Effective stack height shall be calculated by the following equation:

$$h_e = h + 0.083 V_e D_e \left[1.5 + 0.82 \left(\frac{T_e - 550}{T_e} \right) D_e \right]$$

Table A-8 Texas Fuel Combustion Emission Regulations (Con't)

where: h_e = effective stack height in feet

h = physical stack height above ground level in feet

V_e = Stack exit velocity in feet per second

D_e = Stack exit inside diameter in feet

T_e = Stack exit temperature in degrees Rankin

2) No person may cause, suffer, allow or permit emission of particulate matter from a source or sources operated on a property or from multiple sources operated on contiguous properties to exceed any of the following net ground level concentrations:

(a) One hundred (100) mircrograms per cubic meter (ug/m^3) of air sampled, averaged over any five (5) consecutive hours.

(b) Two hundred (200) micrograms per cubic meter (ug/m^3) of air sampled, averaged over any three (3) consecutive hours.

(c) Four hundred (400) micrograms per cubic meter (ug/m^3) of air sampled, averaged over any one (1) hour period.

3) The above rules shall not apply to solid fossil fuel fired steam generators.

No person may cause, suffer, allow or permit emissions of particulate matter from any solid fossil fuel fired steam generator to exceed 0.3 lbs. per million Btu heat input.

Table A-8a. Allowable Particulate Emission Rates for Specific Flow Rates

Effluent Flow Rate acfm	Rate of Emission lb/hr
1,000	3.5
2,000	5.3
4,000	8.2
6,000	10.6
8,000	12.6
10,000	14.5
20,000	22.3
40,000	34.2
60,000	44.0
80,000	52.6
100,000	60.4
200,000	92.9
400,000	143.0
600,000	184.0
800,000	219.4
1,000,000	252.0

Interpolation and extrapolation of the data specified above shall be accomplished by the use of the equation $E = 0.048\ q^{0.62}$ where E is the allowable emission rate in lb/hr and q is the stack effluent flow rate in acfm.

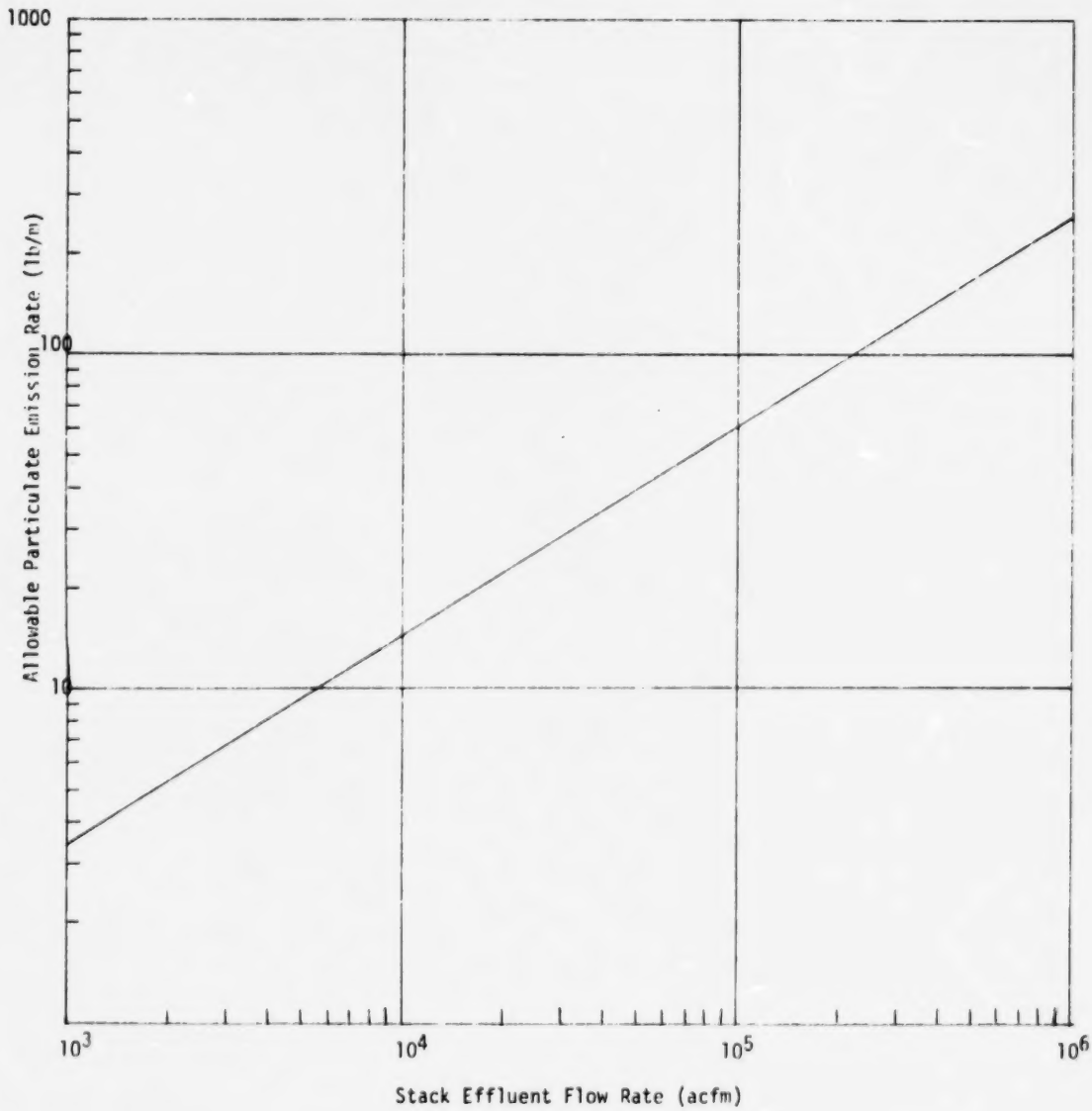

Figure A-2 Stack Effluent Flow Rate

Table A-8b. Standard Effective Stack Height based on Specific Flow Rates

Effluent Flow Rate acfm	Standard Effective Stack Height ft
1,000	12
2,000	15
4,000	19
6,000	22
8,000	24
10,000	26
20,000	34
40,000	43
60,000	49
80,000	55
100,000	59
200,000	75
400,000	96
600,000	110
800,000	122
1,000,000	132

Interpolation and extrapolation of the data in this table shall be accomplished by the use of the equation $H_e = 1.05\ q^{0.35}$ where H_e is the standard effective stack height in feet and q is the stack effluent flow rate in acfm.

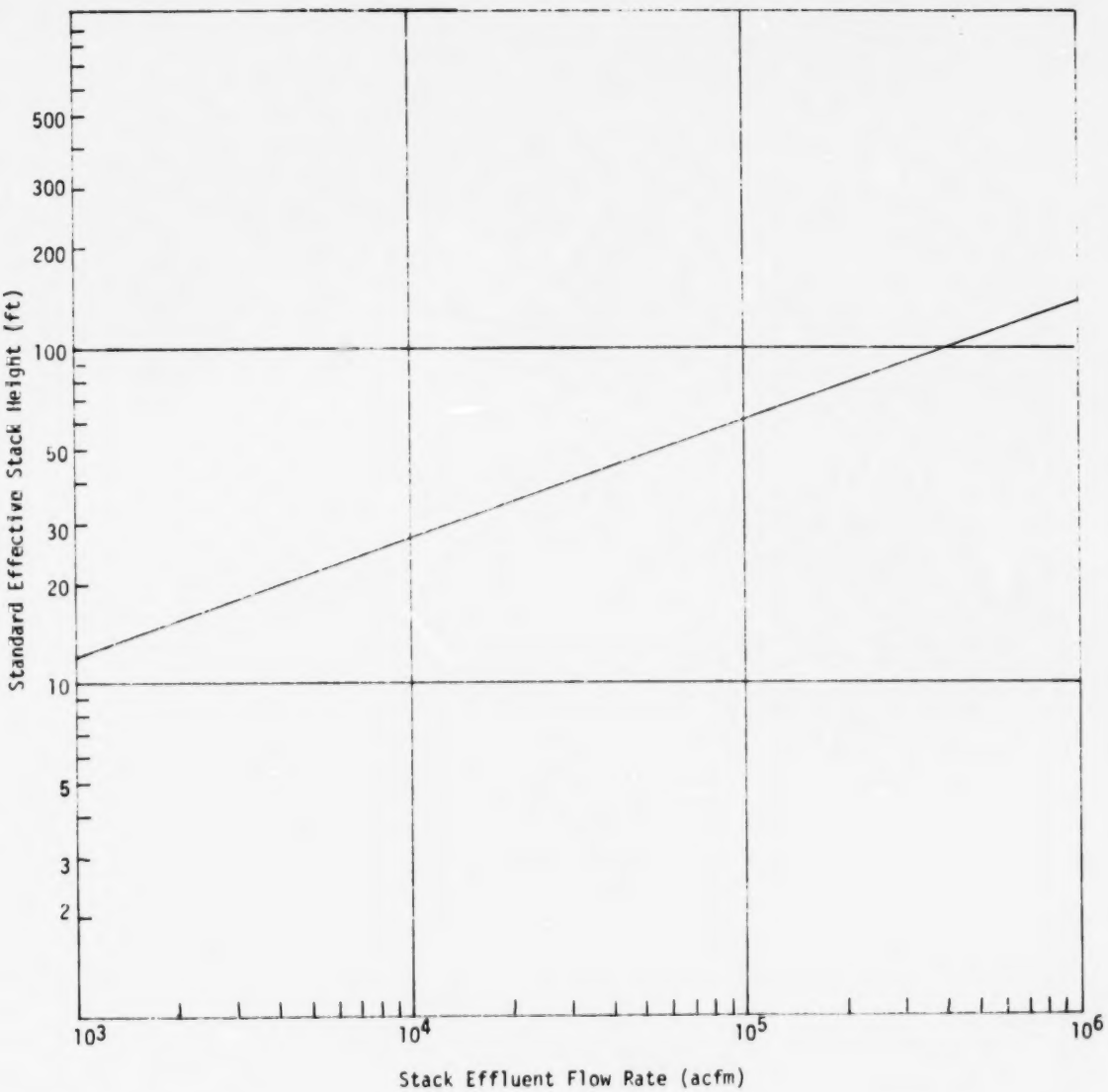

Figure A-3 Standard Effective Stack Height Based on Specific Flow Rates

Table A-8 Texas Fuel Combustion Emission Regulations (Con't)

Sulfur Dioxide [3]

1) No person may cause, suffer, allow or permit emissions of sulfur dioxide from any solid fossil fuel fired steam generator to exceed 3.0 lbs. per million Btu heat input. New proven technology must be applied in removing sulfur dioxide from the emission from solid fossil fuel fired steam generators when it becomes available.

2) No person may cause, suffer, allow or permit emissions of sulfur dioxide from any liquid fuel fired steam generator, furnace or heater to exceed 400 ppm. by volume.

   (a) If a source has an effective stack height of less than the standard effective stack height as determined from Table A-8c and/or Figure A-4, the allowable emission concentration must be reduced by multiplying it by

$$\left(\frac{\text{Effective Stack Height}}{\text{Standard Effective Stack Height}} \right)^2$$

   (b) Effective stack height shall be calculated by the equation in the rule for particulate matter.

3) No person in Galveston or Harris counties may cause, suffer, allow or permit emissions of sulfur dioxide from a source or sources operated on a property or multiple sources operated on contiguous properties to exceed a net ground level concentration of 0.28 ppm averaged over any 30-minute period.

4) No person in Jefferson or Orange countires may cause, suffer, allow or permit emissions of sulfur dioxide from a source or sources operated on a property or multiple sources operated on contiguous properties to exceed a net ground level concentration of 0.32 ppm averaged over any 30-minute period.

Table A-8 Texas Fuel Combustion Emission Regulations (Con't)

5) No person may cause, suffer, allow or permit emissions of sulfur dioxide from a source or sources operated on a property or multiple sources operated on contiguous properties to exceed a net ground level concentration of 0.40 ppm averaged over any 30-minute period.

[1] Corresponds to those portions of Rule 103 (which relates to visible emissions) that would apply to fuel combustion equipment.

[2] Corresponds to the various sections of Rule 105 which would apply to fuel combustion equipment.

[3] Corresponds to the various sections of Rule 201 which would apply to fuel combustion equipment.

Table A-8c. Steam Generators, Bailers and Heaters
Burning Liquid Fuel Standard Effective Stack Height
Based on Specific Flow Rate

Effluent Flow Rate scfm	Standard Effective Stack Height ft
1,000	15
2,000	22
4,000	31
6,000	38
8,000	44
10,000	49
20,000	69
40,000	98
60,000	120
80,000	138
100,000	155

Interpolation and extrapolation of the data in this table shall be accomplished by the use of the equation $H_e = 0.49\ q^{0.50}$, where H_e is the standard effective stack height in feet and q is the stack effluent flow rate in acfm.

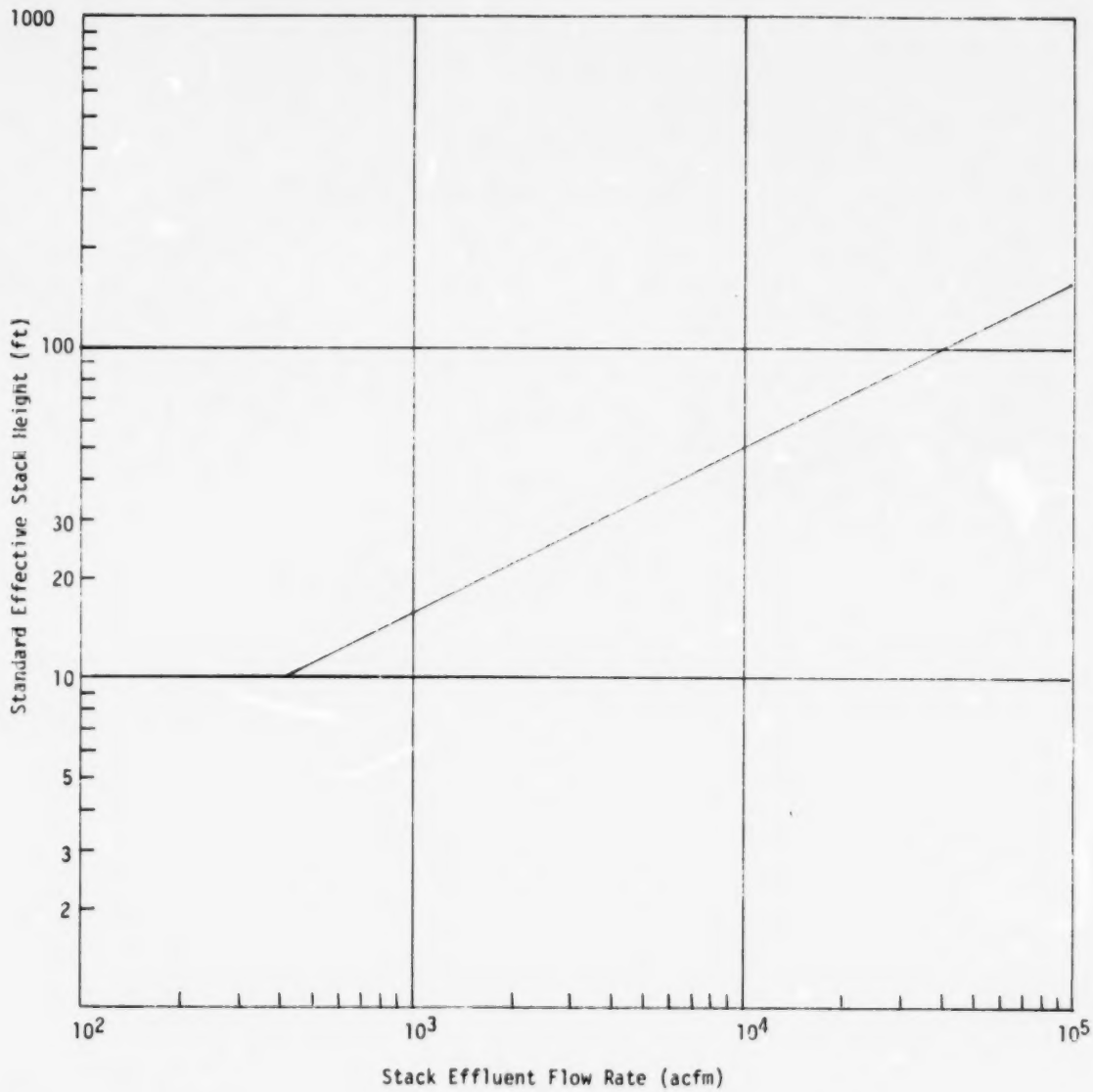

Figure A-4 Standard Effective Stack Height Based on Specific Flow Rates

Table A-9. Required Emission Reductions a) - Particulates, Texas

SIP					1972 DATA			
AQCR	AQ Measurement Control Value	Emissions (10^3 Tons)	Allowable Emissions (10^3 Tons)	1975 Estimated Emissions After Controls (10^3 Tons)	Percent Reduction Required Based On 1973 AQ Data	NEDS Emissions (10^3 Tons)	Allowable Emissions (10^3 Tons)	Emission Tolerance (10^3 Tons)
022[b]	-	d	-	-	5	100.3	95.3	-5.0
106[b]	-	d	-	-	70	44.6	13.4	-31.2
153[b]	-	d	-	-	79	7/2	1.5	-5.7
210	-	d	-	-	52	60.2	28.9	-31.3
211	-	d	-	-	48	71.3	37.1	-34.2
212	-	d	-	-	44	78.1	43.7	-34.4
213	-	d	-	-	65	10.1	3.5	- 6.6
214	-	d	-	-	68	36.0	11.5	-24.5
215	-	d	-	-	56	39.7	17.5	-22.2

See footnotes on the following page.

Table A-9. Required Emission Reductions a) - Particulates, Texas (Continued)

	SIP				1972 DATA			
AQCR	AQ Measurement Control Value	Emissions (10^3 Tons)	Allowable Emissions (10^3 Tons)	1975 Estimated Emissions After Controls (10^3 Tons)	Percent Reduction Required Based On 1973 AQ Data	NEDS Emissions (10^3 Tons)	Allowable Emissions (10^3 Tons)	Emission Tolerance (10^3 Tons)
216	c	d	-	-	86%	106	14.8	-91.2
217	-	d	-	-	49%	30.5	15.6	-14.9
218	-	d	-	-	52%	21.8	10.5	-11.3

a) Considering only the Texas portion of interstate AQCRs.

b) Interstate

c) Proportional rollback model was not used so there was no specific air quality measurement used as a control value. Rather, the amount of control prescribed by the SIP was ascertained by applying the regulation to the existing emissions of the state; major sources. AQDM was used to estimate the air quality that would correspond to existing and controlled levels of emissions, and these values are 92 ug/m3 and 55 ug/m3 AGM respectively.

d) Information not available in the SIP

Table A-10. Required Emission Reductions [a] -SO_2, Texas

AQCR	SIP: AQ Measurement Control Value	SIP: Emissions (10^3 Tons)	SIP: Allowable Emissions (10^3 Tons)	SIP: 1975 Estimated Emissions After Controls (10^3 Tons)	1972 DATA: Percent Reduction Required Based On 1973 AQ Data	1972 DATA: NEDS Emissions (10^3 Tons)	1972 DATA: Allowable Emissions (10^3 Tons)	1972 DATA: Emission Tolerance (10^3 Tons)
022[b]	-	-	-	-	f	54.3	f	-
106[b]	-	-	-	-	f	137.3	f	-
153[b]	1900 ug/m^3[c]	-	d	e	f	178.7	f	-
210	-	-	-	-	f	4.7	f	-
211	-	-	-	-	f	84.6	f	-
212	-	-	-	-	f	56.3	f	-
213	-	-	-	-	-	3.3	-	-
214	-	-	-	-	-51%	20.2	30.5	10.3
215	-	-	-	-	f	17.2	f	-

a Considering only the Texas portions of interstate AQCRs.

b Interstate

c A three hour average - selected as the highest representative concentration. A proportional rollback analysis indicates that air with this SO_2 concentration will require a 31.6% reduction in emissions to reach NAAQS.

d Since the emissions for this AQCR were not included in the SIP, it is impossible to give the allowable emissions level.

e The magnitude in tons of emissions after controls were not provided by the SIP, but it was mentioned that an overall emission reduction of 43% would be obtained due to controls on sources in this AQCR.

Table A-10. (Con't) Required Emission Reductions [a] -SO_2 Texas

SIP					1972 DATA			
AQCR	AQ Measurement Control Value	Emissions (10^3 Tons)	Allowable Emissions (10^3 Tons)	1975 Estimated Emissions After Controls (10^3 Tons)	Percent Reduction Required Based On 1973 AQ Data	NEDS Emissions (10^3 Tons)	Allowable Emissions (10^3 Tons)	Emission Tolerance (10^3 Tons)
216	70 ug/m^3 [g]	176.3	151.1 [h]	120.6 [i]	-91%	185	353.4	168.4
217	-	-	-	-	f	25.3	f	-
218	-	-	-	-	f	63.4	f	-

f Not calculated. See footnote "E" of Table A-5 for explanation.

g An annual arithematic mean estimated using the Miller-Holtzworth model.

h Based on a rollback of 14.3% derived using a proportional model.

i Based on information provided in the SIP which indicates application of Texas' regulations for SO_2 would result in an emissions reduction of 55,700 tons per year.

APPENDIX B

Tables B-1 and B-2 are the assessment of AQCRs which should be examined for the fuel switching impact on particulate and SO_2 emissions. They also provide an identification of those AQCRs which show little potential for fuel revision or regulation relaxation if ambient air standards are to be attained.

The general criteria for candidacy is covered by the list of questions found at the beginning of Section 2.0. Some of the more important criteria is reflected by the tables in this appendix. These criteria include (1) the breadth of air quality violations, (2) the fraction of total emissions resulting from fuel combustion, (3) proposed AQMA designations, (4) expected attainment dates, (5) total regional emissions, and (6) regional tolerances for emissions increase.

It should be noted that an AQCR may not necessarily need relaxation of regulations in order to accomplish fuel switching. Further, a good candidate in Tables B-1 and B-2 may later show little potential for fuel switching after individual sources are examined. Finally, it is possible that an AQCR may have air quality levels below standard at present and may require more <u>strict</u> regulations than currently exist if all fuel burning sources were converted to dirtier fuels, i.e., "average" emission rate now may be below "average" regulations.

Table B-1. Candidacy Assessment for Relaxation of Particulate Regulations - Texas

AQCR	# of Stations	# of Stations Rpt'g Violations of Nat'l Secondary Standard: Annual	24-Hour	Expected Attainment Dates (Secondary Standards)[c]	Counties with Proposed AQMA Designations for Particulates	1972 Total Emissions (10^3 tons/yr)	1972 Emissions from Fuel Combustion (10^3 tons/yr)	% Emissions from Fuel Combustion	Tolerance for Emissions Increase (10^3 tons/yr)	Regionwide[d] Evaluation
Shreveport-Texarkana-Tyler[b] (022)	3	1	0	7/75	3 - Hardin, Orange, Jefferson	100.3	1.6	1.6	- 5.0	Poor
Southern Louisiana-Southeast Texas[a] (106)	12	8	5	7/75	None	44.6	8.8	19.7	-31.2	Poor
El Paso-Las Cruces-Alamogordo[a] (153)	25	17	20	7/75	None	7.2	0.5	6.6	- 5.7	Poor
Abilene- Wichita Falls (210)	3	2	2	7/75	None	60.2	1.4	2.2	-31.3	Poor
Amarillo-Lubbock (211)	18	1	11	7/75	None	71.3	2.8	3.9	-34.2	Poor
Austin-Waco (212)	12	3	3	7/75	None	78.1	15.1	19.3	-34.4	Poor
Brownsville-Laredo (213)	6	3	3	7/75	None	10.1	9.1	0.1	- 6.6	Poor
Corpus Christi-Victoria (214)	19	6	5	7/75	2 - Nueces, San Patricio	36.0	1.3	3.6	-24.5	Poor

a) For interstate AQCRs, information applies only to the Texas portions.
b) Interstate
c) Based on information obtained from EPA - Durham.
d) In these cases the responses refer specifically to an AQCR's candidacy for increasing particulate emissions. However, an AQCR which is a "poor" candidate for increasing particulate emissions, would no doubt also be a "poor" candidate for relaxation of the particulate regulations.

Table B-1. Candidacy Assessment for Relaxation of Particulate Regulations - Texas (Cont'd)

AQCR	# of Stations	# of Stations Rpt'g Violations of Nat'l Secondary Standard Annual	24-Hour	Expected Attainment Dates (Secondary[c] Standards)	Counties with Pronosed AQMA Designations for Particulates	1972 Total Emissions (10^3 tons/yr)	1972 Emissions from Fuel Combustion (10^3 tons/yr)	Emissions from Fuel Combustion	Tolerance for Emissions Increase (10^3 tons/yr)	Regionwide[d] Evaluation
Metropolitan Dallas-Fort Worth (215)	42	15	12	7/75	(11)- Collin, Dallas, Denton, Ellis, Hood, Johnson, Kaufman, Parker Rockwell Tarrant, Wise	39.7	4.0	10.1	-22.2	Poor
Metropolitan Houston-Galveston (216)	60	35	20	7/75	(7) - Brazoria, Fort Bend, Galveston Harris Liberty, Montgomery, Waller	106	7.0	6.6	-14.8	Poor
Metropolitan San Antonio (217)	12	4	4	7/75	None	30.5	1.4	4.4	-14.9	Poor
Midland-Odessa-San Angelo (218)	5	2	2	7/75	None	21.8	1.1	4.7	-11.3	Poor

See footnotes on previous page.

Table B-2. Candidacy Assessment for Relaxation of SO_2 Regulations[a] - Texas

AQCR	# of Stations[b]	# of Stations Reporting Violations of National Standards Annual	24-hr	3-hr	Expected Attainment Date (Secondary[c] Standards)	Counties with Proposed AQMA Designations for SO_2	1972 Total Emissions (10^3 tons/yr)	1972 Emissions from Fuel Combustion (10^3 tons/yr)	% Emissions from Fuel Combustion	Tolerance for Emissions Increase (10^3 tons/yr)	Regionwide[d] Evaluation
Shreveport-Texarkana-Tyler (022)	3 + 0	0	0	-	e	0	54.3	3.1	5.8	f	Good
Southern Louisiana-Southeast Texas (106)	6 + 1	0	0	0	7/75	0	137.3	3.9	2.8	f	Good
El Paso-Las Cruces-Alamogordo (153)	7 + 1	0	0	0	7/75	0	178.7	2.0	1.1	f	Good
Abilene-Wichita Falls (210)	4 + 0	0	0	-	7/75	0	4.7	0.8	17.4	f	Good
Amarillo-Lubbock (211)	7 + 0	0	0	-	7/75	0	84.6	1.1	0.2	f	Good
Austin-Waco (212)	7 + 0	0	0	-	e	0	56.3	44.1	78.3	f	Good
Brownsville-Laredo (213)	0 + 0	-	-	-	e	0	3.3	0.6	18.5	-	Marginal[g]
Corpus Christi-Victoria (214)	6 + 1	0	0	0	7/75	0	20.2	0.8	4.1	10.3	Good
Metropolitan Dallas-Fort Worth (215)	11 + 1	0	0	0	e	0	17.2	4.8	27.7	f	Good

See footnotes on next page.

Table B-2. (Con't) Candidacy Assessment for Relaxation of SO_2 Regulations - Texas[a]

AQCR	# of Stations[b]	# of Stations Reporting Violations of National Standards Annual	24-hr	3-hr	Expected Attainment Date (Secondary[c] Standards)	Counties with Proposed AQMA Designations for SO_2	1972 Total Emissions (10^3 tons/yr)	1972 Emissions from Fuel Combustion (10^3 tons/yr)	% Emissions from Fuel Combustion	Tolerance for Emissions Increase (10^3 tons/yr)	Regionwide Evaluation[d]
Metropolitan Houston-Galveston (216)	45 + 1	0	0	0	7/75	1 - Galveston	185	24.3	13.1	168.4	Good[h]
Metropolitan San Antonio (217)	6 + 0	0	0	-	e	0	25.3	1.7	6.4	f	Good
Midland-Odessa-San Angelo (218)	5 + 0	0	0	-	7/75	0	63.4	3.0	4.7	f	Good

a For interstate AQCRs, information herein applies only to the Texas portions.
b Gives number of bubbler monitors + number of continuous monitors
c EPA and State of Texas are currently evaluating the prospect of revising these dates.
d In these cases the responses refer specifically to an AQCR's candidacy for increasing SO_2 emissions. Since the restrictiveness of Texas' regulations cannot be evaluated within the context of this review's methodology, it would not be appropriate to recommend that regulation relaxation should be the method of choice for increasing SO_2 emissions.
e Ambient air below NAAQS when attainment data listing was formalized.
f Air quality data indicates that there is a substantial tolerance for emissions increase, but this was not calculated since the methodology being used would result in unrealistically high figures which would serve to mislead the reader. (See footnote "e" on Table A-5 for further explanation.)
g The Marginal rating is based on the lack of air quality data for this AQCR.
h SO_2 emissions can be increased only outside of Galveston County which is a proposed AQMA. Due to this AQMA, the Region as a whole would be a Poor candidate for regulation relaxation.

Table B-3. Total State Area Fuel Use[a] - Texas

Source (Area Only)	COAL		RESID. OIL		DIST. OIL		GAS		WOOD		TOTAL
	10^3 tons	10^9 Btu	10^3 gal	10^9 Btu	10^3 gal	10^9 Btu	10^6 ft^3	10^9 Btu	tons	10^9 Btu	10^9 Btu
Residential	0	0	0	0	7550	1133	288550	288550	0	0	289683
Industrial	0	0	108870	15786	292520	43878	1148750	1148750	0	0	1208414
Commercial/ Institutional	0	0	26710	3873	218220	32733	148910	148910	0	0	185516
Total (Area Sources)	0	0	135580	19659	518290	77744	1586210	1586210	0	0	1683613
% by Fuel		0		1.2		4.6		94.2		0	
Total (All Fuels, All Sources)	70.64	1342	268701	38962	524056	78608	4218448	4218448	326065	3261[b]	4340621
% by Fuel		0.03		0.9		1.8		97.1		0.08	

[a] Fuel use figures are taken from data in NEDS data bank as of September 1974

[b] Heat content of wood assumed to be 5000 Btu/lb

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APPENDIX C

This appendix provides a characterization of individual power plants by AQCR. Current power plant information used to prepare Table C-1 was obtained from three main sources: (1) Federal Power Commission computerized listings of power plants and their associated fuel use, (2) the National Coal Association's Steam-Power Plant Factors, listing of power plants and fuel use in 1972, and (3) emission data in the NEDS data bank as of June 29, 1974. Fuel schedules for 1973 were extracted from the FPC data (1 above), and this was used in conjunction with NEDS emission data to estimate 1973 emissions for each of the sources. When 1973 fuel schedules were not available, 1972 schedules were used as taken from NEDS. SO_2 and particulates emissions are those associated with the fuel shown. When actual emissions were not listed in NEDS, AP-42 emission factors were used to estimate SO_2 and particulate emissions, based on fuel schedules.

After the name of each plant is a listing of the fuels for which the plant was designed (from source 1). For the purposes here, it is assumed that when a plant is shown to have dual fuel capability, it is able to use entirely one fuel or the other.

The "allowable" emission levels shown in this Appendix apply only in those cases where the effective stack height is greater than, (or equal to) the standard effective stack height. To determine which of the individual sources meet this criteria requires data which was not available for this review.

It might be cautioned that AQCR total emissions calculated in the tables of Appendix C (and also Appendix D) may not agree exactly with total emissions represented in Appendix A (Tables A-6, A-7). This is a result of both differing fuel schedules in 1973 compared to previous years and the relative "completeness" of the NEDS data bank.

The units for the annual amounts of fuel used for individual sources in this Appendix are 10^3 gallons for oil, tons for solid fossil fuels, and 10^6 cubic feet for natural gas.

Table C-1. Power Plant Fuel Combustion Point Source Characterization - Shreveport-Texarkana-Tyler, AQCR 022

County	Company Plant Size (Plant Name) Fuel Design	Fuel Use: Type % Sulfur % Ash	Fuel Use: Annual Quantity	Fuel Use: Heat Input (10^6 Btu/hr)	Emissions: SO_2 Existing tons/yr	Emissions: SO_2 Existing lbs/10^6 Btu	Emissions: SO_2 Allowable[a] tons/yr	Emissions: SO_2 Allowable[a] lbs/10^6 Btu	Emissions: Particulates Existing tons/yr	Emissions: Particulates Existing lbs/10^6 Btu	Emissions: Particulates Allowable[b] tons/yr	Emissions: Particulates Allowable[b] lbs/10^6 Btu
Gregg	So.W.Elect Pwr 193 MW (Knox Lee) G	Gas	11502	1311	3				86		1324	
Morris	So.W.Elect Pwr 50 MW	Oil 0.6%S	11.4	7.64	22				.2		340	
	(Lone Star) G	Gas	2412	275	1				18			
Marion	So.W.Elect.Pwr 879 MW (Wilkes) G	Oil 2.0%S	2.0	1.34	13				1		2774	
Red River	Texas Pwr & Light 113 MW	Oil 0.66%S	203	136	436				34		454	
	(River Crest) O G	Gas	12488	1424	4				94			
Cherokee	Texas Pwr & Light 704 MW	Oil 0.61%S	59.4	39.8	118				10		1536	
	(Stryker Creek) G	Gas	30691	3499	1				230			
Henderson	Texas Pwr & Light 412 MW	Oil 0.62%S	252	169	510				42		2243	
	(Trinidad) O G	Gas	16393	1869	5				123			
	Total			8732	1113				639		8671	

[a]Allowable levels of SO_2 emissions for these facilities cannot be determined using the data available for this review.

[b]The allowable level of particulate emissions listed here may have to be reduced by a factor derived from each source's stack parameters. See Table A-8 for the details of the calculations.

Table C-1. Power Plant Fuel Combustion Point Source Characterization, Southern Louisiana - S.E. Texas, AQCR 106

County	Company Plant Size (Plant Name) Fuel Design	Fuel Use: Type % Sulfur % Ash	Fuel Use: Annual Quantity	Fuel Use: Heat Input (10^6 Btu/hr)	Emissions: SO_2 Existing tons/yr	Emissions: SO_2 Existing lbs/10^6 Btu	Emissions: SO_2 Allowable[a] tons/yr	Emissions: SO_2 Allowable[a] lbs/10^6 Btu	Emissions: Particulates Existing tons/yr	Emissions: Particulates Existing lbs/10^6 Btu	Emissions: Particulates Allowable[b] tons/yr	Emissions: Particulates Allowable[b] lbs/10^6 Btu
Jefferson	Gulf States Util.	Oil	106	67.0	52				18			
	452 MW O	0.16%S									3415	
	(Neches) G	Gas	25712	2931	8				193			
Orange	Gulf States Util.	Oil	3.02	2.02	1				1			
	1547 MW O	0.1 % S									1633	
	(Sabine) G	Gas	47881	5458	14				359			
	Total			8458	75				571			5048

[a]Allowable levels of SO_2 emissions for these facilities cannot be determined using the data available for this review.

[b]The allowable level of particulate emissions listed here may have to be reduced by a factor derived from each source's stack parameters. See Table A-8 for the details of the calculations.

Table C-1. Power Plant Fuel Combustion Point Source Characterization, El Paso-Las Cruces-Alamogordo, AQCR 153

County	Company Plant Size (Plant Name) Fuel Design	Fuel Use: Type % Sulfur % Ash	Fuel Use: Annual Quantity	Fuel Use: Heat Input (10^6 Btu/hr)	Emissions: SO_2 Existing tons/yr	Emissions: SO_2 Existing lbs/10^6 Btu	Emissions: SO_2 Allowable[a] tons/yr	Emissions: SO_2 Allowable[a] lbs/10^6 Btu	Emissions: Particulates Existing tons/yr	Emissions: Particulates Existing lbs/10^6 Btu	Emissions: Particulates Allowable[b] tons/yr	Emissions: Particulates Allowable[b] lbs/10^6 Btu
El Paso	El Paso Elect Co. 266 MW (Newman) G	Oil 1.3% S	24.0	16.1	102				4			
		Gas	17927	1972	5				134		1324	
	Total			1988	107				138		1324	

[a]Allowable levels of SO_2 emissions for these facilities cannot be determined using the data available for this review.

[b]The allowable level of particulate emissions listed here may have to be reduced by a factor derived from each source's stack parameters. See Table A-8 for the details of the calculations.

Table C-1. Power Plant Fuel Combustion Point Source Characterization, Abilene-Wichita Falls, AQCR 210

County	Company Plant Size (Plant Name) Fuel Design	Fuel Use: Type % Sulfur % Ash	Fuel Use: Annual Quantity	Fuel Use: Heat Input (10^6 Btu/hr)	Emissions: SO_2 Existing		Emissions: SO_2 Allowable[a]		Emissions: Particulates Existing		Emissions: Particulates Allowable[b]	
					tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu
Young	Texas Elect.Serv. 634 MW (Graham) O	Oil 0.57%S	127	85.1	236				21		967	
	G	Gas	25628	2922	8				192			
Mitchell	Texas Elect. Serv. 846 MW (Morgan Creek) O	Oil 0.64% S	244	163	509				41		3282	
	G	Gas	41920	4779	13				314			
Wichita	Texas Elect. Serv 25 MW (Wichita Falls) O	Gas	64	7.3	1				1			
	G											
Taylor	West Texas Util. 26 MW (Abilene) O	Oil 0.42% S	17.9	12.0	24				3		229	
	G											
Hardeman	West Texas Util. 45 MW (Lake Pauline) O	Oil 0.6% S	62.1	41.6	121				10		101	
	G	Gas	2370	270	1				18			
Haskell	West Texas Util. 242 MW (Paint Creek) O	Oil 0.37% S	128	85.8	154				22		1123	
	G	Gas	9494	1082	3				71			
	Total			9448	1069				692		5702	

[a]Allowable levels of SO_2 emissions for these facilities cannot be determined using the data available for this review.

[b]The allowable level of particulate emissions listed here may have to be reduced by a factor derived from each source's stack parameters. See Table A-8 for the details of the calculations.

Table C-1. Power Plant Fuel Combustion Point Source Characterization - Amarillo-Lubbock, AQCR 211

County	Company Plant Size (Plant Name) Fuel Design	Fuel Use: Type % Sulfur % Ash	Annual Quantity	Heat Input (10^6 Btu/hr)	Emissions: SO_2 Existing tons/yr	SO_2 Existing lbs/10^6 Btu	SO_2 Allowable[a] tons/yr	SO_2 Allowable[a] lbs/10^6 Btu	Particulates Existing tons/yr	Particulates Existing lbs/10^6 Btu	Particulates Allowable[b] tons/yr	Particulates Allowable[b] lbs/10^6 Btu
Lubbock	Lubbock Pwr & Light Oil		35.6	23.9	116				6			
	50 MW O	-									332	
	(Holly Ave) G	Gas	3305	377	1				25			
	Lubbock Pwr & Light Oil		30.2	20.2	98				5			
	(Sta #2) O	-									609	
	81 MW G	Gas	4053	462	1				30			
Yoakum	So.W Public Serv.	Gas	7243	826	2				54		1135	
	80 MW O											
	(Denver City) G											
Potter	So.W. Public Serv.	Oil	6.0	4.02	20				1			
	(East Plant) O											
	71 MW G	Gas	6730	767	2				50		1231	
	So.W. Public Serv.	Oil	13.0	8.71	42				2			
	(Nichols) O										1830	
	475 MW	Gas	19564	2230	6				147			
Moore	So.W. Public Serv.	Gas	3154	360	1				24		603	
	68 MW											
	(Moore County) G											
Lamb	So.W. Public Serv.	Oil	40	26.8	130				7			
	434 MW O										1906	
	(Plant X) G	Gas	21068	2402	6				158			
Hutchinson	So.W. Public Serv.	Gas	2470	282	1				19		373	
	35 MW G											
	(Riverview)											
Lubbock	So.W. Public Serv.	Oil	5.0	3.35	16				1			
	248 MW										769	
	(Jones) G	Gas	11465	1307	3				86			
Total				9100	445				615		8788	

[a] Allowable levels of SO_2 emissions for these facilities cannot be determined using the data available for this review.

[illegible] level of particulate matter of the listed type may have to be reduced by a factor [illegible] from each separate

Table C-1. Power Plant Fuel Combustion Point Source Characterization, Austin-Waco, AQCR 212

County	Company (Plant Name) Plant Size Fuel Design	Fuel Use: Type % Sulfur % Ash	Fuel Use: Annual Quantity	Fuel Use: Heat Input (10^6 Btu/hr)	Emissions: SO_2 Existing tons/yr	Emissions: SO_2 Existing lbs/10^6 Btu	Emissions: SO_2 Allowable[a] tons/yr	Emissions: SO_2 Allowable[a] lbs/10^6 Btu	Emissions: Particulates Existing tons/yr	Emissions: Particulates Existing lbs/10^6 Btu	Emissions: Particulates Allowable[b] tons/yr	Emissions: Particulates Allowable[b] lbs/10^6 Btu
Travis	Au in Elect.Co. (Holly) G	Oil 0.84%S	319	214	872				54		1720	
	416 MW	Gas	8892	1013	3				67			
	Austin Elect.Co. (Seaholm) G	Oil 0.93%S	208	139	630				35		1400	
	125 MW	Gas	3600	410	1				27			
	City of Austin Elect. (Decker) G	Oil 0.45%S	271	182	397				46		938	
	321 MW	Gas	12709	1449	4				95			
Bastrop	Lwr Colo.Rvr.Auth. (Gideon) O	Oil 0.02%S	458	307	30				77		845	
	623 MW G	Gas	25312	2886	8				190			
Freestone	Dallas Pwr & Lte. (Big Brown) G	Lignite 0.6%S	4732000	8103[c]	53935	1.52[c]		3.0	11194	0.32[c]		.3
	1187 MW	10.4%A										
Mclennan	Texas Pwr & Light (Lake Creek) O	Oil 0.38%S	150	101	186				25		1051	
	316 MW G	Gas	19987	2279	6				150			
	Texas Pwr & Light (Tradinghouse)	Oil 0.54%S	140	93.8	247				24		146	
	1380 MW O	Gas	44198	5039	13				331			
	Total			21676	57534				379681		6100	

[a]Allowable levels of SO_2 emissions for these facilities cannot be determined using the data available for this review.

[b]The allowable level of particulate emissions listed here may have to be reduced by a factor derived from each source's stack parameters. See Table A-8 for the details of the calculations.

[c] Calculation based on FPC updated NEDS emissions and a heat content of 15 x 10^6 Btu/ton for the lignite

Table C-1. Power Plant Fuel Combustion Point Source Characterization, Brownsville-Laredo, AQCR 213

County	Company Plant Size (Plant Name) Fuel Design	Fuel Use: Type % Sulfur % Ash	Fuel Use: Annual Quantity	Fuel Use: Heat Input (10^6 Btu/hr)	Emissions: SO_2 Existing tons/yr	Emissions: SO_2 Existing lbs/10^6 Btu	Emissions: SO_2 Allowable[a] tons/yr	Emissions: SO_2 Allowable[a] lbs/10^6 Btu	Emissions: Particulates Existing tons/yr	Emissions: Particulates Existing lbs/10^6 Btu	Emissions: Particulates Allowable[b] tons/yr	Emissions: Particulates Allowable[b] lbs/10^6 Btu
Hidalgo	Central Pwr & Lgt	Oil	15.2	10.2	50				3			
	189 MW (Bates) G	Gas	8697	991	3				65		1032	
Webb	Central Pwr & Lgt 72 MW (Laredo) G	Gas	4222	481	1				32		594	
Victoria	Central Pwr & Lgt 554 MW (Victoria) G	Oil 0.13%S	26.1	17.5	11				4			
		Gas	23283	2654	7				175		2348	
	Total			4154	72				279		3974	

[a]Allowable levels of SO_2 emissions for these facilities cannot be determined using the data available for this review.

[b]The allowable level of particulate emissions listed here may have to be reduced by a factor derived from each source's stack parameters. See Table A-8 for the details of the calculations.

Table C-1. Power Plant Fuel Combustion Point Source Characteristization, Corpus Christi-Victoria, AQCR 214

County	Company Plant Size (Plant Name) Fuel Design	Fuel Use			Emissions							
					SO_2				Particulates			
					Existing		Allowable[a]		Existing		Allowable[b]	
		Type % Sulfur % Ash	Annual Quantity	Heat Input (10^6 Btu/hr)	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu
Nueces	Central Pwr & Lte (Hill) G 574 MW	Oil 0.01%S	20.5	13.7	1				3		1852	
		Gas	19119	2180	6				143			
	Central Pwr & Lte (Nueces Bay) 596 MW G	Oil 0.02%S	418	280	27				70		1005	
		Gas	19765	2253	6				148			
Cameron	Central Pwr & Lte 230 MW G (San Benito)	Oil	1.7	1.14	6				1		1258	
		Gas	11811	1346	4				89			
Calhoun	Central Pwr & Lte 261 MW G (Joslin)	Oil 0.02%S	116	77.7	8				19		869	
		Gas	11291	1287	3				85			
	Total			7439	61				557			

[a]Allowable levels of SO_2 emissions for these facilities cannot be determined using the data available for this review.

[b]The allowable level of particulate emissions listed here may have to be reduced by a factor derived from each source's stack parameters. See Table A-8 for the details of the calculations.

Table C-1. Power Plant Fuel Combustion Point Source Characterization - Metro. Dallas-Ft. Worth AQCR 215

County	Company Plant Size (Plant Name) Fuel Design	Fuel Use: Type % Sulfur % Ash	Fuel Use: Annual Quantity	Fuel Use: Heat Input (10^6 Btu/hr)	Emissions: SO_2 Existing tons/yr	Emissions: SO_2 Existing lbs/10^6 Btu	Emissions: SO_2 Allowable[a] tons/yr	Emissions: SO_2 Allowable[a] lbs/10^6 Btu	Emissions: Particulates Existing tons/yr	Emissions: Particulates Existing lbs/10^6 Btu	Emissions: Particulates Allowable[b] tons/yr	Emissions: Particulates Allowable[b] lbs/10^6 Btu
Parker	Brazos Elect.Pwr	Oil	19.1	12.8	83				3		734	
	75 MW O	1.33% S										
	(North Texas) G	Gas	3150	359	1				24			
Palo Pinto	Brazos Elect.Pwr	Oil	134	89.8	245				23		450	
	188 MW O	0.56%S										
	(Miller) G	Gas	8164	931	2				61			
Dallas	Dallas Pwr & Lte	Oil	69.7	46.7	186				12		1779	
	(Dallas) O	0.82%S										
	224 MW G	Gas	4601	525	1				35			
	Dallas Pwr & Lte	Oil	305	204	657				51		3854	
	(Mountain Creek)	0.66%S										
	990 MW O	Gas	37103	4230	11				278			
	G											
	Dallas Pwr & Lte	Oil	371.8	250	1005				62		1987	
	(North Lake) O	0.82%S										
	709 MW G	Gas	23759	2712	7				178			
	Dallas Pwr & Lte	Oil	78.3	52.5	278				13		1821	
	(Parkdale) O	1.09%S										
	341 MW G	Gas	7675	875	2				58			
	Dallas Pwr & Lte	Oil	603	404	315				101		464	
	(Lake Hubbard) O	0.16%S										
	928 MW G	Gas	10449	1191	3				78			

[a]Allowable levels of SO_2 emissions for these facilities cannot be determined using the data available for this review.

[b]The allowable level of particulate emissions listed here may have to be reduced by a factor derived from each source's stack parameters. See Table A-8 for the details of the calculations.

Table C-1. Power Plant Fuel Combustion Point Source Characterization - Metro. Dallas-Ft. Worth AQCR 215 (Continued)

County	Company Plant Size (Plant Name) Fuel Design	Fuel Use: Type % Sulfur % Ash	Fuel Use: Annual Quantity	Fuel Use: Heat Input (10^6 Btu/hr)	Emissions: SO_2 Existing tons/yr	Emissions: SO_2 Existing lbs/10^6 Btu	Emissions: SO_2 Allowable[a] tons/yr	Emissions: SO_2 Allowable[a] lbs/10^6 Btu	Emissions: Particulates Existing tons/yr	Emissions: Particulates Existing lbs/10^6 Btu	Emissions: Particulates Allowable[b] tons/yr	Emissions: Particulates Allowable[b] lbs/10^6 Btu
Denton	City of Denton Util.	Oil	81.2	54.4	114				14			
	189 MW O	0.43%S									920	
	(Denton) G	Gas	4479	511	1				34			
Dallas	Garland Muni.Pwr & Light	Oil	94.1	63.0	371				16			
	97 MW (Newman) O	1.21%S									916	
	G	Gas	1753	200	1				13			
Collin	Garland Muni Pwr. & Lte.	Oil	93.0	62.3	161				16			
	189 MW (Olinger) O	0.53%S									1072	
	G	Gas	7286	831	2				55			
Tarrant	Texas Elec. Serv.	Oil	126	84.4	234				21			
	(Eagle Mt) O	0.57% S									2919	
	706 MW G	Gas	17180	1959	5				129			
	Texas Elec.Serv.	Oil	29.0	19.4	63				5			
	(Handley) O	0.67%S									1992	
	523 MW G	Gas	24606	2805	7				185			
	Texas Elec. Serv.	Oil	99.0	66.3	213				17			
	(North Main) O	0.66%S									397	
	116 MW G	Gas	35780	4079	11				268			

[a] Allowable levels of SO_2 emissions for these facilities cannot be determined using the data available for this review.

[b] The allowable level of particulate emissions listed here may have to be reduced by a factor derived from each source's stack parameters. See Table A-8 for the details of the calculations.

Table C-1. Power Plant Fuel Combustion Point Source Characterization - Metro. Dallas-Ft. Worth AQCR 215 (Continued)

County	Company Plant Size (Plant Name) Fuel Design	Fuel Use: Type % Sulfur % Ash	Fuel Use: Annual Quantity	Fuel Use: Heat Input (10^6 Btu/hr)	Emissions: SO_2 Existing tons/yr	Emissions: SO_2 Existing lbs/10^6 Btu	Emissions: SO_2 Allowable[a] tons/yr	Emissions: SO_2 Allowable[a] lbs/10^6 Btu	Emissions: Particulates Existing tons/yr	Emissions: Particulates Existing lbs/10^6 Btu	Emissions: Particulates Allowable[b] tons/yr	Emissions: Particulates Allowable[b] lbs/10^6 Btu
Collin	Texas Pwr & Light	Oil	180	121	152				30		483	
	156 MW O	0.26%S										
	(Collin) G	Gas	6352	724	2				48			
Fannin	Texas Pwr & Lte	Oil	504	338	394				85		2582	
	1175 MW O	0.24%S										
	(Valley) G	Gas	31750	3620	10				238			
	Totals			27421	4537				2151		22370	

[a]Allowable levels of SO_2 emissions for these facilities cannot be determined using the data available for this review.

[b]The allowable level of particulate emissions listed here may have to be reduced by a factor derived from each source's stack parameters. See Table A-8 for the details of the calculations.

Table C-1. Power Plant Fuel Combustion Point Source Characterization - Metro. Houston - Galveston, AQCR 216

County	Company Plant Size (Plant Name) Fuel Design	Fuel Use			Emissions							
					SO_2				Particulates			
					Existing		Allowable[a]		Existing		Allowable[b]	
		Type % Sulfur % Ash	Annual Quantity	Heat Input (10^6 Btu/hr)	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu
Galveston	Houston Lighting & Power (Robinson) G 1550 MW	Gas	90800	10351	27				681		1540	
Harris	Houston Lighting & Power (Bertron) G 826 MW	Oil 2.17%S	924	619	6535				155			
		Gas	41489	4730	12				311		2941	
	Houston Lighting & Power (Wharton) G 323 MW	Oil 0.4%S	418	280	545				70			
		Gas	14605	1665	4				110		1229	
	Houston Lighting & Power (Webster) G 614 MW	Oil	20.2	13.5	165				3			
		Gas	27524	3138	8				206		2004	
Montgomery	Gulf States Util. 545 MW (Lewis Creek) O G	Oil 0.04%S	27.8	18.6	4				5			
		Gas	28577	3258	9				214		1717	

[a] Allowable levels of SO_2 emissions for these facilities cannot be determined using the data available for this review.

[b] The allowable level of particulate emissions listed here may have to be reduced by a factor derived from each source's stack parameters. See Table A-8 for the details of the calculations.

Table C-1. Power Plant Fuel Combustion Point Source Characterization - Metro. Houston - Galveston, AQCR 216 (Continued)

County	Company Plant Size (Plant Name) Fuel Design	Fuel Use			Emissions							
					SO_2				Particulates			
					Existing		Allowable[a]		Existing		Allowable[b]	
		Type % Sulfur % Ash	Annual Quantity	Heat Input (10^6 Btu/hr)	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu
Harris	Houston Lighting & Power (Deep Water) G 335 MW	Oil 2.10%S	196	131	1343				33			
		Gas	12819	1461	4				96		6293	
	Houston Lighting & Power (Greens Bayou) G 821 MW	Oil 1.10%S	226	151	811				38			
		Gas	19583	2232	6				147		1638	
	Houston Lighting & Power C (Clarke) 210 MW	Oil 2.64%S	38.4	25.7	331				6			
		Gas	2211	252	1				17		1437	
Fort Bend	Houston Lighting & Power G (Parish) 1255 MW	Oil 2.38%S	66.3	44.4	514				11			
		Gas	60059	6847	18				450		2987	
Chambers	Houston Lighting & Power G 1530 MW (Cedar Bayou)	Gas	84320	9612	25				632		928	
	Totals			44829	10362				3185		22714	

[a] Allowable levels of SO_2 emissions for these facilities cannot be determined using the data available for this review.

[b] The allowable level of particulate emissions listed here may have to be reduced by a factor derived from each source's stack parameters. See Table A-8 for the details of the calculations.

Table C-1. Power Plant Fuel Combustion Point Source Characterization - Metro. San Antonio, AQCR 217

County	Company (Plant Name) Plant Size Fuel Design	Fuel Use: Type, % Sulfur, % Ash	Fuel Use: Annual Quantity	Fuel Use: Heat Input (10^6 Btu/hr)	Emissions: SO_2 Existing tons/yr	Emissions: SO_2 Existing lbs/10^6 Btu	Emissions: SO_2 Allowable[a] tons/yr	Emissions: SO_2 Allowable[a] lbs/10^6 Btu	Emissions: Particulates Existing tons/yr	Emissions: Particulates Existing lbs/10^6 Btu	Emissions: Particulates Allowable[b] tons/yr	Emissions: Particulates Allowable[b] lbs/10^6 Btu
Bexar	City Pub.Serv.Bd. (Leon Creek) G 236 MW	Oil 0.78%S	147	98.5	98.5				25		727	
		Gas	954	109	1				7			
	City Pub. Serv.Bd. (Mission Rd.) G 146 MW	Oil 0.89%S	45.6	30.6	132				8		863	
		Gas	2335	266	1				18			
	City Pub. Serv.Bd. (Braunig) G 885 MW	Oil 0.56%S	276	185	503				46		2676	
		Gas	29067	3314	9				218			
	City Pub.Serv.Bd. (Tuttle) G 441 MW	Oil 0.81%S	305	204	805				51		1878	
		Gas	7730	881	2				58			
Comal	Lower Colorado River Auth. G 60 MW (Comal)	Oil 0.85%S	192	129	53]				32		1097	
		Gas	11.1	1.27	1				1			
	Totals			5278	2359				463		7241	

[a]Allowable levels of SO_2 emissions for these facilities cannot be determined using the data available for this review.

[b]The allowable level of particulate emissions listed here may have to be reduced by a factor derived from each source's stack parameters. See Table A-8 for the details of the calculations.

Table C-1. Power Plant Fuel Combustion Point Source Characterization - Midland-Odessa-San Angelo, AQCR 218

County	Company Plant Size (Plant Name) Fuel Design	Fuel Use: Type % Sulfur % Ash	Fuel Use: Annual Quantity	Fuel Use: Heat Input (10^6 Btu/hr)	Emissions: SO_2 Existing tons/yr	Emissions: SO_2 Existing lbs/10^6 Btu	Emissions: SO_2 Allowable[a] tons/yr	Emissions: SO_2 Allowable[a] lbs/10^6 Btu	Emissions: Particulates Existing tons/yr	Emissions: Particulates Existing lbs/10^6 Btu	Emissions: Particulates Allowable[b] tons/yr	Emissions: Particulates Allowable[b] lbs/10^6 Btu
Ward	Texas Elec. Serv. 700 MW (Permian Basin)	O Oil 0.85%S	129	86.4	357				22		-	
		G Gas	10971	1251	3				82			
Ton Green	West Texas Util. Co. (Concho) 53 MW	O Oil 0.5%S	53.6	35.9	87				9		356	
		G Gas	1123	128	1				8			
Coke	West Texas Util. 82 MW (Oak Creek)	O Oil 0.41%S	87.9	58.9	118				15		346	
		G Gas	4182	477	1				31			
Crockett	West Texas Util. 137 MW (Rio Pecos)	G Gas	9108	1038	3				68		658	
Tom Green	West Texas Util (San Angelo) 101 MW	O Oil 0.27%S	35.2	23.6	31				6		570	
		G Gas	4545	518	1				34			
	Totals			3616.8	601				275		1930	

[a]Allowable levels of SO_2 emissions for these facilities cannot be determined using the data available for this review.

[b]The allowable level of particulate emissions listed here may have to be reduced by a factor derived from each source's stack parameters. See Table A-8 for the details of the calculations.

APPENDIX D

The Table D-1 in this appendix lists individual industrial/commercial/institutional sources of particulates and SO_2 emissions which might show fuel switching potential. The sources are from a NEDS rank order emissions listing.

It should be cautioned that the percent emissions accounted for is different than the "% of fuel use accounted for," It is possible that several potential fuel switch sources could be overlooked by the cutoff point on the emissions (i.e., a reasonable sized natural gas used may emit below our cutoff point in the NEDS rank order list).

No information was available for feasibility of <u>any</u> fuel switching.

The units for the annual amounts of fuel used are as follows:

10^3 gallons for oil
10^6 cubic feet for natural gas
tons for wood and bagasse.

The "allowable" emission levels shown in this Appendix apply only in those cases where the effective stack height is greater than, (or equal to) the standard effective stack height. To determine which of the individual sources meet this criteria requires data which was not available for this review.

Table D-1. Industrial-Commercial Fuel Combustion Point Source Characterization - Shreveport-Texarkana-Tyler - AQCR 22

County	Plant Name	Fuel Use			Emissions							
					SO_2				Particulates			
					Existing		Allowable[a]		Existing		Allowable[b]	
		Type % Sulfur % Ash	Annual Quantity	Heat Input (10^6 Btu/hr)	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu
Henderson	Lone Star Gas	Gas	582	66.4	1				6		116	
Smith	LaGloria Oil	Gas	586	66.9	1140				4		95	
	Total			133.3	1140				10		211	

[a]Allowable levels of SO_2 emissions for these facilities cannot be determined using the data available for this review.

[b]The allowable level of particulate emissions listed here may have to be reduced by a factor derived from each source's stack parameters. See Table A-8 for the details of the calculations.

ble D-1. Industrial-Commercial Fuel Combustion Point Source Characterization - Southern Louisiana - S.E. Texas - AQCR 106

County	Plant Name	Fuel Use			Emissions							
					SO_2				Particulates			
					Existing		Allowable[a]		Existing		Allowable[b]	
		Type % Sulfur % Ash	Annual Quantity	Heat Input (10^6 Btu/hr)	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu
Angelino	Owens-Illinois	Wood	30,000	34.2*	-				413		2.8	
	Total			34.2	-				413		2.8	

[a]Allowable levels of SO_2 emissions for these facilities cannot be determined using the data available for this review.

[b]The allowable level of particulate emissions listed here may have to be reduced by a factor derived from each source's stack parameters. See Table A-8 for the details of the calculations.

* Heat content of wood assumed to be 5000 Btu/lb

Table D-1. Industrial-Commercial Fuel Combustion Point Source Characterization - Abilene-Wichita Falls - AQCR 210

County	Plant Name	Fuel Use			Emissions							
					SO_2				Particulates			
					Existing		Allowable[a]		Existing		Allowable[b]	
		Type % Sulfur % Ash	Annual Quantity	Heat Input (10^6 Btu/hr)	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu
Shackelford	Colorado Interst. Corp.	Gas	57	6.5	1				1			
	Total			6.5	1				1			

[a]Allowable levels of SO_2 emissions for these facilities cannot be determined using the data available for this review.

[b]The allowable level of particulate emissions listed here may have to be reduced by a factor derived from each source's stack parameters. See Table A-8 for the details of the calculations.

Table D-1. Industrial-Commercial Fuel Combustion Point Source Characterization - Amarillo-Lubbock - AQCR 211

County	Plant Name	Fuel Use			Emissions							
					SO_2				Particulates			
					Existing		Allowable[a]		Existing		Allowable[b]	
		Type % Sulfur % Ash	Annual Quantity	Heat Input (10^6 Btu/hr)	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu
Carson	Skelly Oil Co.	Gas	857	97.8	1				8		153	
Moore	Colorado Interst. Corp.	Gas	423	48.3	1				4			
	Total			146.1	1				12		153	

[a]Allowable levels of SO_2 emissions for these facilities cannot be determined using the data available for this review.

[b]The allowable level of particulate emissions listed here may have to be reduced by a factor derived from each source's stack parameters. See Table A-8 for the details of the calculations.

Table D-1. Industrial-Commercial Fuel Combustion Point Source Characterization - Corpus Christi-Victoria - AQCR 214

County	Plant Name	Fuel Use			Emissions							
					SO_2				Particulates			
					Existing		Allowable [a]		Existing		Allowable [b]	
		Type % Sulfur % Ash	Annual Quantity	Heat Input (10^6 Btu/hr)	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu
Nueces	So. W. Oil	Gas	4093	467.2	1				21		571	
	Total			467.2	1				21		571	

[a] Allowable levels of SO_2 emissions for these facilities cannot be determined using the data available for this review.

[b] The allowable level of particulate emissions listed here may have to be reduced by a factor derived from each source's stack parameters. See Table A-8 for the details of the calculations.

Table D-1. Industrial-Commercial Fuel Combustion Point Source Characterization - Metro. Houston-Galveston - AQCR 216

County	Plant Name	Fuel Use			Emissions							
					SO_2				Particulates			
					Existing		Allowable[a]		Existing		Allowable[b]	
		Type % Sulfur % Ash	Annual Quantity	Heat Input (10^6 Btu/hr)	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu
Fort Bend	Imperial Sugar	Gas	2082	237.7	1				19		213	
	Total			237.7	1				19		213	

[a]Allowable levels of SO_2 emissions for these facilities cannot be determined using the data available for this review.

[b]The allowable level of particulate emissions listed here may have to be reduced by a factor derived from each source's stack parameters. See Table A-8 for the details of the calculations.

BIBLIOGRAPHY

1. "1972 National Emissions Report," U. S. Environmental Protection Agency, EPA-450/2-74-012.

2. "Projections of Economic Activity for Air Quality Control Regions," U.S. Department of Commerce, Bureau of Economic Analysis, prepared for U.S. EPA, August 1973.

3. "Monitoring and Air Quality Trends Report, 1972," U.S. EPA-450/1-73-004.

4. "Steam-Electric Plant Factors/1072," 22nd Edition National Coal Association.

5. "Federal Air Quality Control Regions," U.S. EPA, Pub. No. AP-102.

6. "Assessment of the Impact of Air Quality Requirements on Coal in 1975, 1977 and 1980," U.S. Department of the Interior, Bureau of Mines, January 1974.

7. "Fuel and Energy Data," U.S. Department of Interior, Bureau of Mines, Government Printing Office, 1973, 0-550-211.

8. "Compilation of Air Pollutant Emission Factors, 2nd Edition," U.S. EPA, Air Pollution Tech., Pub. AP-42, April 1973.

9. SAROAD Data Bank, 1973 Information, U.S. EPA.

10. Federal Power Commission, U.S. Power Plant Statistics Stored in EPA Data Bank, September 1974.

11. "Energy Potential from Organic Wastes: A Review of the Quantities and Sources," Bureau of Mines Information Circular 8549, Department of Interior, 1972, written by L. L. Anderson.

12. "Implementation Plan Evaluation Report for the State of Texas."

13. "Texas Air Pollution Control Implementation Plan," submitted January 28, 1972 by Governor Preston Smith.